



## **WP6 - The Ag2020 Case Studies**

### **Report on the Central Denmark Region Case Study**

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AG2020

Foresight analysis for world agricultural markets (2020) and Europe

PRIORITY AREA 1: Sustainable management of Europe's natural resources:

1.1. Modernisation and sustainability of agriculture and forestry, including their multifunctional role, in order to ensure the sustainable development and promotion of rural areas

Contract no.: 44280-AG2020, STREP, January 2007 – December 2009

## **WP6 - The Ag2020 Case Studies**

### **Report on the Central Denmark Region Case Study**

**D6.1 – D6.2 – D6.3 – D6.4**

**Hansen JG, & Borch K, Trombi G & Stratigea A  
August 2010**

**Organisation name of lead contractor for this deliverable:**

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## **1. Part I – General context and methodological approach**

The present part, section 1.1, shows some introductory information as to the AG2020 project in terms of goals and objectives pursued as well as methodological approach adopted. Next, in section 1.2, is presented the role and objectives of WP6 within the AG2020 framework. In section 1.3 the three AG2020 Images of the Future are presented. Finally, in section 1.4, is described the structure of the present report, which is firmly followed by the four case studies involved in the Project, namely the Rhodope Mountainous region in Bulgaria (CS1), The Kastelli region (Herakleion nomos) in Greece (CS2), the Central Denmark Region in Denmark (CS3) and the Tuscany region in Italy (CS4).

### ***1.1. The AG2020 Project***

The agricultural sector is one of the most important production sectors of the global economy, as it largely determines the population's survival and quality of life. This holds for the quantity and quality as well as the safety of the agricultural products. Agriculture is also considered as a sector determining the development potential of a significant part of the European territory - namely the rural regions - and is largely associated with the economic prosperity, tradition, production systems, culture etc. of the European local regions' population – the farmers.

Increasing population growth rates and economic performance, at a global scale, impose significant demand for increasing agricultural production and quality standards. This stresses the importance of the environmental dimension in the agricultural sector considering the pressure exerted by the agricultural production on the environment.

Therefore, it has become an imperative for future policies in agriculture to focus on sustainability targets namely environmental, social and economic, incorporating at the same time the quality-safety dimension in the agricultural production. This implies that, key issues-drivers of today's change - likely to be of relevance, in a policy context, over the medium and long term - need to be identified and strategic decisions have to be made, in order to cope with the uncertainty involved in policy making.

The AG2020 Project aims, among others, at developing a *methodological framework* for the structuring of policy scenarios for the development of agriculture in Europe 2020. The vision of AG2020 is to improve decision-making and enhancement of resilience for common EU agricultural policy (CAP) reforms by synthesising a range of policy scenarios for the year 2020, based on various quantitative and qualitative analysis.

In order to do so, the project consists of three important parts (see AG2020, D5.3).

Firstly, the **foresight process** in which the current and expected future states of the European agricultural sector and rural areas are explored. Together with the outcomes of participatory approaches, this should result in the identification of trends and influential factors, so called drivers of change to the future of agriculture in Europe.

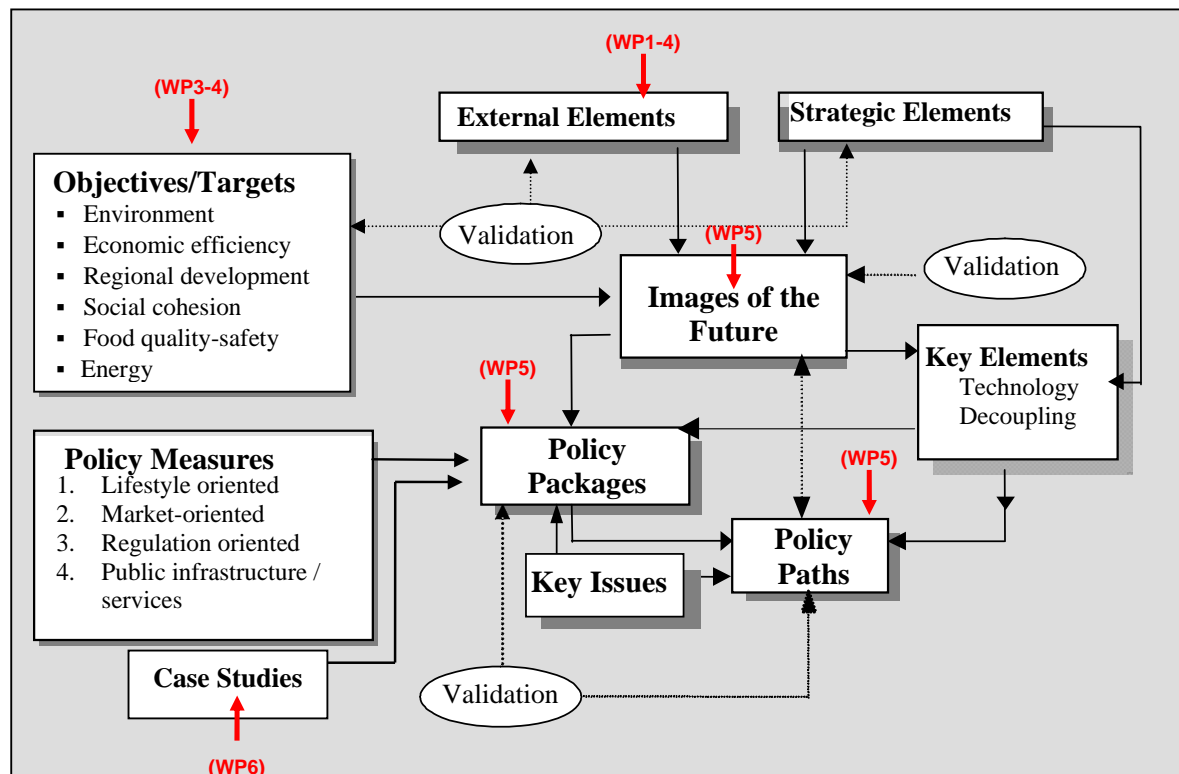
Secondly, **the strategic policy scenarios framework** (the backcasting process) is presented. In this part, sustainability targets together with the drivers of change are

used to develop strategic policy scenarios in order to meet the EU objectives. This requires the development of possible and desirable 'Images of the Future' for agriculture in Europe for 2020 and related policy packages enabling to reach them.

Finally, in the third part, **regional development scenarios are assessed and validated at local level** in various European regions (four regions), aiming at revealing the different types of challenges and threats faced by the different regional agricultural systems at EU level. These provide input to AG2020 as to the peculiarities of different EU agricultural systems and the policies needed in order to deal with these challenges and threats.

The AG2020 Project focus is on the:

- Development of a foresight methodology enabling the study of the various types of agricultural systems and their specific challenges and constraints in the EU countries;
- Identification and analysis of trends and influential factors (drivers of change) by use of participatory approaches that may influence the possible future developments of EU agriculture in the various countries. This includes combination of both quantitative and qualitative data by way of scenario methods using indicators and stakeholder validation;
- Development of strategic policy scenarios (backcasting) based on the identified major drivers of change for the impact assessment of the probable and desirable future directions of agriculture, including multifunctionality of rural areas and emergence of new agricultural exporting regions for the effective enforcement of the proposed alternative sets of policies;
- Development of indicators of EU sustainability targets in order to evaluate the different policies on a regular basis and to perform sensitivity analysis to policy scenarios on a regional basis.



**Figure 1:** The AG2020 backcasting framework

The AG2020 backcasting framework is presented in Figure 1. Additionally, the contribution of AG2020 Workpackages to the overall effort is also shown, the main tasks of which are as follows:

- WP1: Frames and mapping of regional agricultural challenges
- WP2: The role of stakeholders
- WP3: Analysis of major challenges and constraints – Trade and market measures and policies
- WP4: Analysis of major challenges and constraints – Non-marked policy factors
- WP5: Backcasting policy scenarios
- WP6: Foresight analysis on regional basis – case studies

In the following, the objectives of AG2020 and the Images of the Future are shortly presented.



### **1.1.1. The AG2020 objectives**

The selected objectives in AG2020 are formulated as follows (see AG2020, Deliverable 5.3):

- Environmental protection
- Economic efficiency
- Regional development
- Social cohesion
- Food safety and quality
- Energy

More precisely, sustainability in the agricultural sector, from the point of view of AG2020, is encompassing (Giaoutzi and Stratigea, 2007a, 2007b):

- Environmental aspects: preserving ecological balance of physical and biological systems, for present and future generations.
- Economic efficiency aspects: based on the concept of “... attaining the maximum flow of income that can be created, while at least maintaining the renewable stocks or assets that yield these benefits” (Stimson et al, 2006, p.40).
- Regional development aspects: aiming at the reduction of disparities in rural areas and the equal access to employment, services, etc.
- Social cohesion aspects: aspiring to maintain the stability of social and cultural systems, by pursuing a healthy and productive life in harmony with the environment.
- Food quality and safety aspects: that aim to promote food safety and trust in agricultural qualitative products for consumers, a trend that will continue receiving attention in both industrialized and in less developed countries (Unnevehr, 2003).
- Energy aspects: that aim at reaching the EU climate change target of reducing 20% GHG emissions compared to 1990. For this objective, EU has planned its long term energy policy up to 2020.

### ***1.2. The Three AG2020 Images of the Future***

Based on the backcasting methodological approach presented above, three AG2020 Images of the Future are constructed for covering a sufficiently wide range of future developments of the agricultural sector in the EU. These Images reflect different combinations of contextual and strategic elements as defined within the AG2020

project (see AG2020, Deliverable 5.3). A short description of each Image is presented in the following text boxes.

### **1.2.1. Image I: High-tech Europe**

High-tech Europe. Global Cooperation for Sustainable Agriculture (“Top-down” approach)

Europe is politically and economically the strongest block in the world, playing a leading role in climate change policy. Europe is rich; its wealth is mainly based on its leading role in the High-Tech sector. The EU is a very strong and cohesive institution, while the national member states have lost part of their influence. EU has developed strong partnerships with other global players as India, Russia, China, Brazil, etc., while multilateral institutions (UNO, WTO) are rather weak, with a fragmentation in the rest of the world. GDP growth is high (around 2.3 % at EU average) and large investments in science and research activities are being realised. In particular, clean energy technologies are of utmost importance for the European wealth, with efficient and CO<sub>2</sub>-lean energy technologies being the basic pillar of economic growth. At the same time, EU policy strongly promotes energy efficiency and renewables for climate change, energy security and economic competition. The population is slightly growing. Standards of living are comparatively homogeneous throughout Europe at a high level. Lifestyles are consumption-oriented exhibiting a high degree of trust in technology. Cheap mass products are quite popular and there is a focus on status symbols and brands. The international lifestyle has gained strength. Prices are playing an important role in consumption patterns, while there is a preference for convenience, functional, ethno and fast food, with emphasis on out-of-home consumption. ICTs dominate in international relations. The development and adoption of ICTs has contributed to the strong networking and cooperation among EU businesses and citizens, which brings the various actors closer and diffuses knowledge and information throughout the whole EU territory. In this context, agri and food sectors are intensive users of high tech (precision farming, biotechnology, GMO, traceability – labelling), which results into an increased efficiency of the sector. Adoption of technological advances has remarkable consequences for food quality, meeting thus the increasing demand of customers for qualitative and nutritive products. Intensive use of technology has increased efficiency in the agricultural sector, with strong market orientation. As a result, support to farmers is phased-out. More precisely, CAP (1<sup>st</sup> pillar) places emphasis on efficiency in agricultural production, enforcing measures for phasing out support to farmers, while, in the second pillar of the CAP, the core of the EU measures focus on the support for investments in new technologies.

The energy sector is setting high blending targets of biofuels, placing emphasis on the 2<sup>nd</sup> generation of biofuels and the enhanced use of biomass (energy crops or exploitation of agricultural waste), by means of technological advances, although no mandatory targets exist. There is a high degree of integration of agri-food systems in the international markets, where trade liberalisation is based on bilateral agreements. There is a low regulatory framework in agricultural factor markets. WTO is far less powerful and ineffective due to a fragmented world, where there is no enhancement of multilaterally agreed international rules. Green issues are not pushed by a broad support, while public participation is led by centralized initiatives (national and EU). It is rather the politicians trying to find solutions at the EU and global level. Nevertheless, there is some degree of green consciousness and an acceptance of policy measures intended to mitigate the environmental problems. Low emphasis is placed on regionally targeted policies to protect flora and fauna.

### 1.2.2. Image II: In Search of Balance

#### Image II: In Search of Balance: Accord on Sustainability (“Combined” approach)

A balance of power has been reached between local, regional and supranational initiatives and objectives, a kind of harmony between “bottom-up” and “top-down” politics. The overarching political structures of Europe are powerful due to consensus among economic leading powers of the world on global issues, such as environment and energy. A kind of balance of power has evolved based on strong public involvement in local and regional affairs. Strong local identity and regional/national governments have emerged. A more passive support has also evolved for EU coordination and policies on high level issues. EU is a network of European nations closely cooperating and does not exert political enforcement. Strong multilateral institutions and governance (WTO, UNFCCC) with consensus on international regulations to combat climate change has also emerged. Finally there is strong public participation at all levels of governance and decision making. GDP growth is moderate (around 1.9 % at EU average). International division of labour is medium. Considerable technological progress is triggered by focussed technological developments. Energy production, with emphasis placed on the development of bio-based economy, creates a balanced supply. The population is slightly increasing due to regulated migration to and from other parts of the world, taking into account market and societal needs. A cooperation spirit permeates all levels of interaction among individuals, locally, regionally, at national and EU levels as well as globally. Though some political problems are still difficult to handle, there is a respect for other parties’ interests and a willingness to find win-win solutions. There is a strong support for the principle of subsidiarity due to the high level of interest and initiatives in societal matters by the general public. Social stratification is balanced, despite the continuing heterogeneity with very rich and very poor people living in Europe. Green values are widespread with both local and international lifestyles, while food preferences appear to be mixed, ranging from local to international.

ICTs play an important role in every day life and facilitate mobility. It also contributes to the quality in production, communication and mobility. The agri-food sector is exhibiting a continuous trend in technological cost-saving progress, traceability and monitored labelling. There is an enhanced use of biotechnology and GMO. There is a medium focus on food quality, expected throughout the whole range of preferred food products (regional, international food) and a strong belief in labelling. There is a sufficient mass of public investments in bioenergy and biomaterials (bio-based economies). Balance between regional and international agri-food markets. There is a continued CAP (1<sup>st</sup> pillar) reform process and an increase in modulation of direct payments. There is also a continuation of current policy in CAP 2<sup>nd</sup> pillar and an increase in transfer of funds from the 1<sup>st</sup> pillar. Agriculture regains importance for the development of rural regions due to the increasing production of renewable resources, e.g. biofuels, and rural development is supported by appropriate policy measures. There is a high mandatory blending target of biofuels, with special emphasis on the 2<sup>nd</sup> generation of biofuels. Main aim of WTO is the enhancement of international rules contributing to the exchange of knowledge and free trade. Therefore, strong WTO and other international organizations are enforcing international regulations on standards. There is a medium level of regulatory framework in the agriculture factor market, based on international rules. Finally, there is moderate emphasis on regionally targeted policies to maintain protected flora and fauna.

### 1.2.3. Image III: Active Regions and Reflexive Lifestyles

#### Active Regions and Reflexive Lifestyles (“Bottom-up” approach)

Policies are mainly driven by local and regional initiatives. Local and regional aspects are high on the political agenda, while global environmental issues are more down on the list. Strong public participation, especially led by community initiatives and regional decision making has emerged. EU, China, Japan and other global players take different stands on key environmental issues and protect their markets against competition from outside. Strong regions/nations exist at the expense of strong multinational institutions. It's more US or EU or Japan first to protect nature and markets but w/o multinational coordination. At the global level no agreement on harmonizing standards is achieved.

GDP grows at a moderate pace (around 1.9 %), and has a high potential, but green GDP develops faster. There is a medium degree of international division of labour and a tendency to export knowledge instead of goods (dematerialization). A tax base reform (in line with the dematerialization strategy) has taken place in the EU countries, shifting taxation from labour to the use of natural resources and energy, with the aim to stimulate conservation of resources. This in parallel with green demand, have made producing firms to reduce their use of energy, materials and hazardous substances. Overall demand is affected and people are willing to pay for greener products as well as for locally produced goods. Production is more local and mainly serves local markets, but is based on licences and the know-how of the big international firms and networks (global production). There is also an increasing share of the service sector, with traditional manufacturing industry showing a declining share of total production.

Population is slightly decreasing; people live longer; migration to and from other parts of the world is hampered by legal and social barriers. Settlement patterns and location of workplace and service functions are also affected. Many urban sub-centres have developed to a higher degree of self sufficiency and city centres are being re-urbanized. People are pushing the politicians to adopt stricter environmental regulations and standards, especially at the local level (urban areas). There has been a trend towards more 'local life-styles' and widespread green values among the general public. People increasingly take responsibility for the common goods, and attitudes towards collective actions are positive, especially at the local and regional levels. Reflexive slow lifestyle; slow food; slow travelling are established. Green values are pushed by grassroots movements rather than by national or EU politicians, who lag behind but try to meet the demand of the people. A high awareness of consumers for regionally produced food is developing and organic farming – ethno food is important. There is strong focus on quality of life, health, well being, recreation, safety and on different routes to achieve these goals. Counter-movements emerge, relating to stress - dominated life styles in the beginning of the century. There is a critical view on technologies. There is strong networking and cooperation with emphasis on green activities. Increased accessibility in ICT networks is pursued to reduce mobility, while there is a certain preference for cyber and virtual applications. There appears a decreased need for transport of agricultural products and inputs. Technological progress is oriented towards food quality (e.g. nanotechnology) and improving regional products. There is a low use of biotechnology and no GMO is allowed. Low technological developments make it difficult to produce for example enough food and biomass at the same time. Local investments are directed in low-tech bio-energy and biomaterials (local bio-based economies). There is high focus on food quality, especially in terms of green and cultural values. Local and organic food is therefore preferred. There is continuation of the current CAP, although payments are more coupled to land use and environmental issues. There is strong support to organic farming. There is an increase in support to rural development policies and also support to regional and local networking. Programmes are directed to small scale farmers to enhance social cohesion. The current mandatory blending of targets of biofuels continues, based on EU regional production. There is a low level of integration into the international markets with strong emphasis on quality criteria (tracing, labelling). Multilateral institutions are weak. Main aim of WTO is the watching of how consensus for multilateral rules can be reached. National regulations on food,

health, environment and labour standards dominate in the international markets. There exists a strong regulation in agricultural factor markets, with quantitative restrictions (e.g. quota) and strong emphasis on regionally targeted policies to maintain flora and fauna. Rural population is working mainly on tourism, gastronomy, etc. Rural areas are specialized in “regionality” (e.g. providing offers for tourists looking for traditional landscape and regional events; producing regional food specialities). Rural areas are also serving as residential areas, as people like living in rural areas (recreation, safety, counter-movement to an otherwise stress-dominated lifestyle). Sustainable rural development is feasible due to a strong regional and “green” focus of consumers and producers.

In the following, the role and objectives of WP6 within the AG2020 framework are presented.

### ***1.3. WP 6 - Foresight Analysis on a Regional Basis - AG2020 Case Studies***

The workpackage 6 focus is relative to the foresight analysis at regional level by means of four case studies that aim at presenting four distinct regional agricultural contexts at EU level. Foresight analysis at this level aims at the development and assessment of regional development scenarios of the respective regions that are bringing into AG2020 the regional differentiation of the AG2020 objectives, the perspectives of the agricultural sector within the different regions as well as the challenges and threats faced by the agricultural sector within the general context described by the AG2020 Images of the Future. Moreover, regional scenarios are validated by local stakeholders and policy measures for the implementation of each scenario are defined, which can be used as input to the pool of policy measures of AG2020, enriching thus this pool by regionally defined policy directions.

The objectives of Workpackage 6 are as follows:

- Identification and selection of representative regional case studies, based on the analysis of WP1, WP3, WP4 and WP5,
- Identification of stakeholders, to be invited to participate in WP6 meetings, based on the criteria defined in WP2
- Collection of regional influential parameters (key parameters) within quantitative analysis of market and non-market factors identified in collaboration with WP3 and WP4.
- Regional sensitivity analysis of policy scenarios developed in WP5. This includes understanding of the objectives of regional stakeholders, and finding attributes (e.g. state of development of technologies, importance of agriculture for rural development, impact of climate change etc.) that can affect the sensitivity of the indicators identified in WP1.

- Validation of the conclusions related to the regional based sensitivity analysis.
- WP6 will support the analysis of WP3 and WP4 on a regional basis by investigating regional frames and targets that may influence the sensitivity of indicators and by collecting regional data necessary for assessing the impact of the policy scenarios developed in WP5.

Representative regional case studies are selected based on the following criteria:

- Challenges of diversified EU agricultural sector mapped and described in WP1 and recognized to be of key importance.
- Factors analysed in WP3 and WP4, liable to have a stronger influence on agricultural development at EU level.
- Factors, identified in WP6 as most challenging and influential at the regional level.
- Balanced geographical representation.

WP6 is carried out in close cooperation with WP1, WP2, WP3, WP4 and WP5: More specifically:

- In cooperation with WP1 representative cases at EU level are identified for regional sensitivity analysis.
- Based on criteria defined in WP2, regional stakeholders are selected to participate in regional sensitivity analysis and validation workshops.
- Furthermore, collection of regional influential parameters (regional key input parameters) is based on the work in WP3 for quantitative analysis of market factors and WP4 for climate changes and other non-market factors.

In Workpackage 6, four Case Studies (CSs) are carried out, namely Rhodope Mountainous region in Bulgaria (CS1), The Kastelli region (Herakleion nomos) in Greece (CS2), the Central Denmark Region in Denmark (CS3) and Tuscany region in Italy (CS4).

#### ***1.4. Structure of WP6 Work - Methodological Approach***

In order to better present the steps undertaken within each case study and the results coming out of this effort, it is decided between the case study leaders and AG2020 project management, to present the four WP6 Case Studies, namely Rhodopes region, Kastelli region, Central Denmark Region and Tuscany region, in a separate report (Rhodopes Case Study Report, Kastelli Case Study Report, Central Denmark Case Study Report and Tuscany Case Study Report respectively). In such a context, each case study report incorporates all partial deliverables due, namely D6.1 (*Description of frames and targets at the regional level for each case study*), D6.2 (*Assessment of Regional Policy Scenarios*), D6.3 (*Stakeholders' validation of alternative policy*

*scenarios at the regional level*) and D6.4 (*Region-specific policy measures*).

More specifically, each case study report is structured so as to include, in particular sections, all four deliverables, as follows:

Part II → D6.1

Part III → D6.2

Part IV → D6.3 and finally

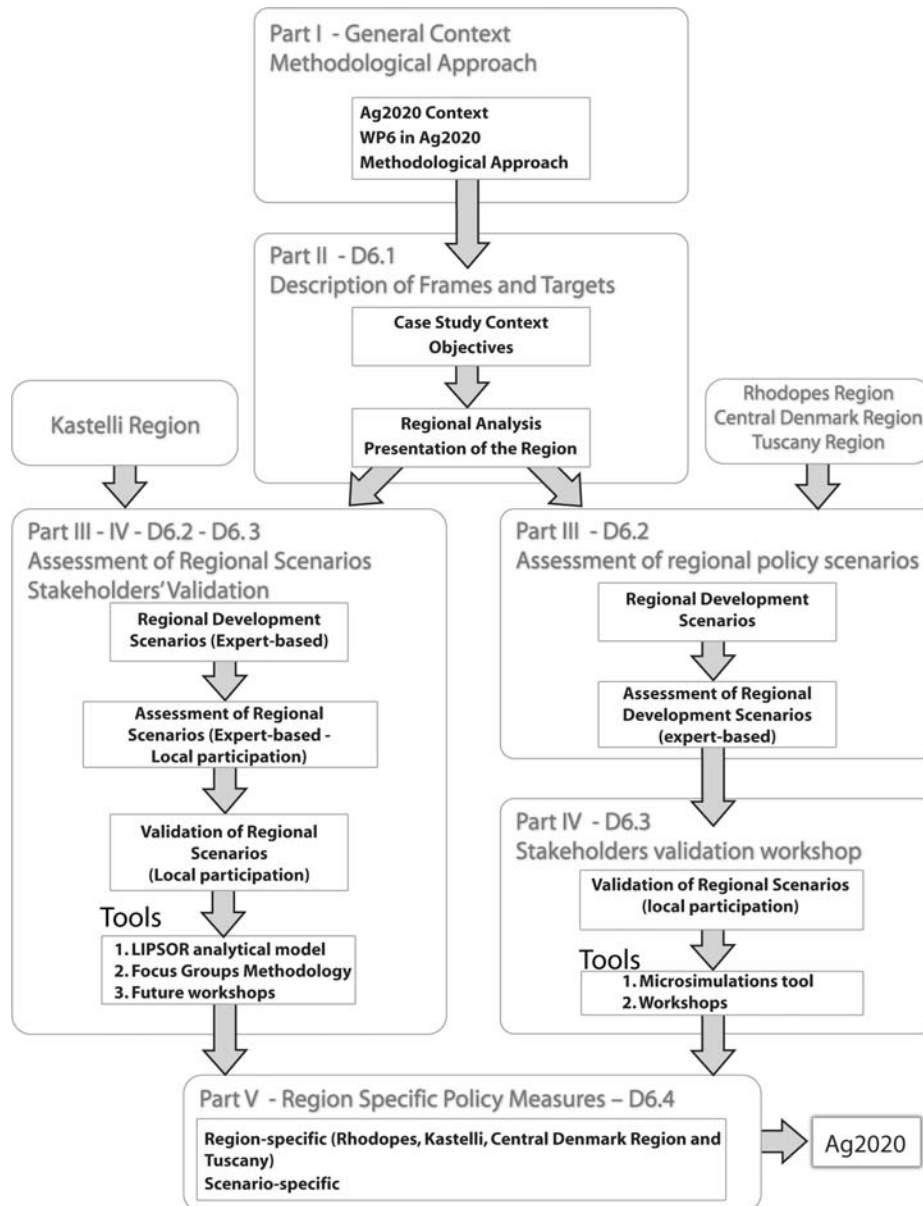
Part V → D6.4

In each specific case study, the steps of the methodological approach adopted have as follows (see Figure 2):

- i. **Description of Frames and Targets (Part II – D6.1):** for each region are presented:
  - a. The objectives of the region, which reflect the six AG2020 objectives, properly adjusted to fit each specific regional context.
  - b. Regional analysis of the region at hand, presenting environmental, social and economic characteristics, social and cultural characteristics, infrastructure networks, etc.
- ii. **Assessment of regional development scenarios (Part III – D6.2):** on the basis of the previous analysis, *regional development scenarios* are developed, taking into account the regional characteristics, the objectives set at the previous stage, as well as developments of the external environment, provided by the AG2020 Images of the Future. More specifically, the scenario building process follows the steps described below:
  - a. A set of hypotheses is structured, based on the key elements of the region at hand, as these are identified by the regional analysis;
  - b. For each hypothesis, different possible future outcomes are drawn;
  - c. Three regional development scenarios are structured, placing at the core the agricultural sector. Each of them presents a different combination of future outcomes of hypotheses considered.

*Expert-based scenario assessment:* the three regional development scenarios are assessed by experts. In such a context, qualitative assessment tools (e.g. SWOT analysis and MULTIPOL evaluation model) are used to carry out scenario assessment for each case study, where it is assessed the performance of each scenario in respect to the objectives set;
- iii. **Stakeholders' validation of the scenarios (Part IV – D6.3):** each regional development scenario is, as a next step, validated by local stakeholders in each region. Tools used for that purpose are:
  - a. The Microsimulation approach.
  - b. Stakeholders' workshops at the local level.

- c. Focus groups methodology integrating Future workshops participatory approach.
- iv. **Region-specific policy measures (Part V – D6.4):** the outcome of the previous steps is a set of region-specific (Rhodopes, Kastelli, Central Denmark and Tuscany regions) and scenario-specific policy measures, which can feed the pool of AG2020 policy measures, reflecting thus region-specific policy directions towards fulfilling the objectives set.



**Figure 2:** The WP6 methodological approach

In the following, is presented each specific step of the above described WP6 methodological approach for the *Central Denmark Region case*.



## **2. Part II – Central Denmark Region Regional Context (D6.1)**

In Part II, which corresponds to the D6.1 Deliverable for the Central Denmark Region Case Study, the regional context of Central Denmark Region is presented. Firstly, in section 2.1, the regional development objectives are presented, in alignment to the AG2020 objectives, properly adjusted to reflect the specific regional context. The section 2.2 is relative to the regions's specific features e.g. population, natural resources, local economic structure, network infrastructure etc..

### ***2.1. Description of Frames and Targets***

In this section, the regional development objectives of the Central Denmark Region region are described, following the six AG2020 objectives and adjusting them accordingly to the Central Denmark Region Case Study regional context.

The number of farms in Denmark is declining steadily. Over the last 50 years, the total number of farms decreased by 75 per cent. In 2006, there were 47,400 farms in Denmark. Today there are 42,000, and the expectation is that the number in 2015 will drop to 29,000. Of those only 9700 suspected being full-time farmers. In 2015, a full-time farmer is expected to have a farm of 220 hectares.

Due to the low prices on the national and global market, Danish farmers search for new types of production and production of new crops. This might change the landscape dramatically. Less profitable fields will increasingly become fallow and turn into shrubland woodland, while energy shortages and climate policy objectives stimulate that crops such as willow and elephant grass for energy production in large numbers can come to replace the grain, oilseed rape and grass.

Danish agriculture has become increasingly specialized. Half of all Danish farms are today without livestock and 80 percent of all milking cows and pigs are already in specialized farms. This development will lead to an industrialization of the landscape - but also to new reflections on corporate branding and social responsibility.

At the same time that the big farms has grown in size and specialization, the proportion of part time and hobby farms has increased markedly. Part-time farmers now represents two thirds of all Danish farms and has largely settled in the peri-rural areas around Copenhagen, Aarhus and Odense. (Source: UMM19side11-16\_MandagMorgen 13-05-2010 18:52 page 11)

The main *goal* of the Central Denmark Region case study is the *Regional Development Plan* for the region, taking into account the potential of the agricultural sector for the development perspective of the area.

Denmark is in the process of dividing into two major economic regions - Ørestad region (Including Copenhagen) and the East Jutland Metropolis (including Aarhus, the main city in the Central Denmark Region). Ørestaden covers an area up in Sweden and around Copenhagen, while the East Jutland Metropolis is from somewhere north of Aarhus in Jutland along the coastline down to the regions just south of Central Denmark Region. Common to the two business areas is that you can get from downtown to the outskirts in about an hour. You can get to and from meetings on half days. Then there is the basis for a more long-lasting cooperation between enterprises and cities involved in the business region. The Central Denmark Region with the city Aarhus as a central city will be very important in this development, and the development potential of the Central Denmark Region will be described and discussed in this context.

### **2.1.1. Environmental protection**

With the first Local Agenda 21 strategy, Central Denmark Region aims to be an active player in energy and environmental matters. The vision of sustainable development is a guiding principle for the development of Central Denmark Region. The aim is to ensure sustainable development in the region for the benefit of both business and citizens. A local Agenda 21-strategy was agreed upon in 2007. The goals defined by the region covers: Reducing the environmental impact, promoting sustainable regional development, involvement of people and businesses in the local Agenda 21 work, promoting interaction between decisions involving environmental, traffic, business, social, health, educational, cultural and economic conditions.

#### **2.1.1.1. Protection of water resources**

The region wants a sustainable use of natural resources by coordinating a sustainable primary food production with environmental, energy and climate policy (The Danish governmental green growth strategy). Its visions are that in 2030 nature and landscape will have an increased quality and cohesion, where there is balance between the use and protection of the nature. The state of the organic environment should be good, the groundwater resources should be protected and the region should be still self-sufficient with clean drinking water.

#### **2.1.1.2. Nature preservation**

Nature should be developed for the benefit animals and plants, but it may also be used as a resource for the citizens, tourists and businesses of the region. In 2030 the region should still be self-sufficient with clean drinking water. Important raw materials should be extracted before the areas are to be used for other purposes. Raw material areas which are close to cities will be utilized first and subsequently developed as natural areas. In rural areas the nature must be developed with consideration of nature itself and for recreation, living, tourism etc. Climate changes and air pollution are global challenges that demand international solutions. The region will work on all levels according to the international agreement on strategies for sustainable development – Agenda 21.

#### **2.1.1.3. Certification of eco-efficient agricultural technology**

There is a continuously need for test and analysis of technologies in the energy and environment sector. This applies not least on wind and biomass, which plays a central role in the visions and goals for Central Denmark Region. The region aims to establish test- and development centres on wind and bioenergy.

### **2.1.2. Economic efficiency**

Increasing economic efficiency of Central Denmark Region can be pursued mainly by focusing on three aspects, namely the increase in qualified workforce, strengthening the collaboration between research institutions and the industry, and promoting innovation and entrepreneurship.

#### **2.1.2.1. Increase qualified workingforce**

The Regional Council aim to qualify the selection of new focus areas to increase the supply of labour, upgrade the qualifications of the unemployed, prevent and shorten sickness and absence of recipients of benefits from the labour market. The region finds it important to qualify the selection of new focus areas to upgrade the qualifications of the workforce and increase the flexibility of those employed. The region will analyze how regional positions of strength may contribute to attracting manpower from the outside world.

#### **2.1.2.2. Collaboration between research institutions, and industry**

The region seeks to strengthen the collaboration between competences from research institutions, and industry on developing quality produce throughout the region.

In a global context the region will promote the coherency between the government's globalization strategy and the regional industrial development Strategy. The region

aim to be able to attract international attention by virtue of its education, outstanding experience attractions, quality products and its multifarious nature. There will be focus on ensuring that companies and educational institutions have the best basis for international activities.

#### **2.1.2.3. Promote innovation and entrepreneurship**

The region will support and promote innovation and entrepreneurship in all sectors taking advantages of new knowledge and technology and to be open minded and experimental.

Continued development and innovation will fortify the region's positions of strength nationally and internationally. Cooperation in networks is a tool in the realization of an attractive region. Competences from knowledge and research environments, large companies and smaller and medium-sized producers as well as accompanying industries cooperate on the development of quality products all over the region. The regional enterprise policy effort will create growth by focusing on education, innovation and entrepreneurship and through special focus areas in the fields of energy and environment, food production and business-health. The development in the food production area will contribute positively to the environment and the health of the population, as well as to the demographic balance in the region. Creative alliances with the cultural life are part of the development of companies and their products. The Growth Forum should develop the business development strategy with a starting point in human resources, innovation and entrepreneurship and with emphasis on the creative qualifications and positions of strength in the region.

The region will support the establishment of SME's in the region and stimulate to increase the total amount of highly educated in SME's in the region. Further more it will support initiatives to increase the survival rate of start-up business, such as reduce economic, regulatory requirements and organizational barriers that make it difficult for plot owners, industry or local authorities to make breakthroughs.

#### **2.1.3. Regional development**

Denmark and the EU will invest over 6 billion DKK (more than 800 million Euro) in the development of rural districts during the period 2010 - 2013. The intention with the Rural Development Programme is to give the population good possibilities for living in and of the rural districts. In order to do this, new employment opportunities have to be created in the rural areas and the business development in the food sector

has to be improved, so the sector can survive the challenges of globalisation. Also, the nature and the environment have to be cared for, and there is finally a general need to improve conditions of life in rural districts. The Ministry of Food, Agriculture and Fisheries is - through the Local Action Groups (LEADER groups) - giving local actors direct influence on the development in the rural areas. The groups are responsible for parts of the programme concerning the creation of new jobs and good living conditions. In Central Denmark Region there are 18 local Action Groups and with a budget of 30 mill Dkr per year for initiatives and projects.

#### **2.1.3.1. Attract citizens, workers and entrepreneurs in rural areas**

The Regional council in collaboration with the Leader Groups will seek to facilitate efficient frames for establishing new business in the region in general. The experience industry and entrepreneurship is supposed to characterize the positive experiences of business development in all areas of the region

#### **2.1.3.2. Education and training of labour resources**

It is important that education is accessible to the population in the rural areas. Distance teaching, among other things, is supposed to help increase the supply of education. The region will analyse the interplay possibilities between educational, labour market and business policy. In a global perspective the region aims to be known for a high level of mobility on all educational levels, there should be focus on cooperation with regions abroad and there should be possibility of virtual institution cooperations. It is recommended by the state government that all regions in Denmark have access to high speed 100 MB broad band network in less than 10 years.

#### **2.1.3.3. Development and strengthen tourism**

The region will strengthen the tourism business (conference, exhibition tourism on agri-food issues, but also agro-eco-tourism activities). There is a need to develop tourism in rural areas with high landscape values i.e. strengthening urban and coastal tourism by strengthening the interplay between these two forms of tourism. The region aims to develop new international experience attractions and all-year tourist destinations.

#### **2.1.3.4. Balanced territorial development**

The region aims to balance the territorial development by establishing new public workplaces in the region within its positions of strength. It will stimulate a sustainable population development in the areas of strength - restructuring of urban settlements network – multi-centered development (poles) – increase territorial integration between urban-rural regions – specialization of sub-regions

#### **2.1.3.5. Development of local communities**

The region seeks to create linkage between protected areas and economic development of local communities through development of site specific experiences, educational activities, local food stuffs and special brands. It will be needed to strengthen the infrastructure in remote areas and to create optimal conditions for development in the less populated areas.

#### **2.1.3.6. High speed broadband to all citizens in regional areas**

It is recommended by the state government that all regions in Denmark have access to high speed 100 MB broad band network in less than 10 years. This is needed regarding education and for strengthening collaboration between business and educational institutions (see 2.1.3.3)

#### **2.1.3.7. Upgrade main roads**

The general vision for the region is that in 2030 the Central Denmark Region will be a region in balance with good accessibility and good connections with the outside world.

#### **2.1.3.8. Improve public transportation**

The public transportation should be made attractive for long distant commuters to workplaces and education institutions.

The Central Denmark Region contains one large city – Aarhus, larger and smaller cities like Viborg, Randers, Herning, Holstebro and Silkeborg, as well as rural areas with various conditions for development. There is a need for solutions which support the development in the entire region and create a region in balance with good cohesion. An effective IT-infrastructure should enable settling and distance work everywhere in the region.

The Central Denmark Region must be an international growth region based on good connections with the outside world. This requires access to, from and through the region for goods and people. The airports (Aarhus Airport and Karup Airport) and harbours in the Central Denmark Region are a significant part of the infrastructure, and it is a priority for the region that access to them is improved in the near future.

The region suggest to establish a fast connection for high-speed trains and cars across Kattegat and a circle line for highspeed trains between Copenhagen-Kattegat-Aarhus-Odense-Copenhagen. This will connect the two metropolises in Denmark – Ørestaden and East Jutland. The time by train from Aarhus to Copenhagen will be

lowered from 2½ hour to appr. 1 hour. The motorways have to be upgraded to get easy access to the European motorways from the entire region, and the access to the harbours and airports has to be improved.

#### **2.1.3.9. East Jutland as the second metropol**

The foundation for long-term economic development in Denmark can be strengthened by establishing a fixed link across Kattegat for high-speed trains and cars between Jutland and Zealand. The overall aim is to tie the two financial centers of east Jutland and the metropolitan area, having merely one hour of travelling time by train between the two cities, in order for Denmark to become one metropolis by European standards

The urban corridor of Eastern Jutland and the Øresund Region are Denmark's two growth centres. In the periodical report on comprehensive regional policy they are separate and understood as two independent centres. In 25 years these two areas will still have the best preconditions for attracting workplaces, working capacity, knowledge etc. and creating growth. However, the vision of the Regional Council includes a vision of tying together the extended urban corridor of Eastern Jutland and the Øresund Region. This creates even better possibilities and more space for unfolding the gathered potential. The extended urban corridor of Eastern Jutland reaches from Aalborg in the north to Kolding in the south, Aarhus in the east and Viborg in the west, as it is expected that the factors that have contributed to the formation of an urban corridor of Eastern Jutland – including the infrastructure – has meant that the urban corridor has been extended to include other cities over the years.

#### **2.1.4. Social cohesion**

The vision for the region for 2030 is the users in the region will experience public transport as reliable and with close connections between the municipal and regional routes. The collected network will ensure the cohesion of the region and link us to the rest of the world. The region will strengthen and develop the social cohesion of the entire region through the operation of the health service.

A cohesive Central Denmark Region is ensured through a specific cooperation with the neighbouring areas concerning the development of business communities, tourism, and research – including university cooperation across administrative borders.

##### **2.1.4.1. Reduce inequalities**

The region aims to reduce inequalities in access to income, employment, culture activities etc. between eastern-western part and core-periphery of CDR

The Regional Council will subsidize development-oriented, professional and interdisciplinary networks in the cultural area. Secondly, develop a regional cultural policy and provide subsidies which will support this within the following three focal points: Development, networking and International outlook and cooperation. It is recommended by the region council that the state government should support the possibilities for the spreading of culture from state cultural institutions, cooperation between the cultural institutions and other players, stimulated to innovation and profiling and support the development of a rich and diverse cultural life in sparsely populated areas.

### **2.1.5. Initiatives on food quality**

The qualities that especially characterize the rural areas must be brought actively into play. This applies, for example, to the particular position of strength in food production, but also such strengths as space for development, nature, social security and tranquility

#### **2.1.5.1. Project: "clever everyday food"**

The food sector represents a clear position of strength in Central Denmark Region, both measured at the size of the production and the diversity of food related companies and knowledge environments. A growing international competition in traditional foods raises the need for a higher degree of innovation and product differentiation in the Danish food production. A key challenge is thus to expand knowledge collaboration between stakeholders in the food sector, especially between knowledge institutions and enterprises.

The Mega-target: "Clever everyday food" strategic goal is that Central Denmark Region should evolve into a significant leading international innovation environment for clever everyday food. Three action plans with identified synergies were introduced: Innovation, Differentiation and Competence. As one example, EUC North West, together with a number of fishing parties and organizations took the initiative to establish of a competence center for fisheries education in Thyborøn, on the West coast of Jutland.

#### **2.1.5.2. Project: "the food-culture-zone"**

Initiation of the regional project "the food-culture-zone" (madkulturzonen) helping development of innovation capacity among regional businesses and provide a basis for new collaborations, new products and new business concepts. The purpose of the



food culture zone is to create a food culture industry, linking competencies and economics from existing business such as tourism, food, gastronomy, culture, transport and development experience. The goal is to "reinvent Denmark as an outstanding host who can offer unique food culture experience."

#### **2.1.6. Bioenergy**

Agriculture is large-scale supplier of bioenergy and renewable energy technologies is a position of strength for CDR. The increasing limitation on energy supply from fossil resources and environmental /climate concerns creates profitable markets renewable energy sources such as biomass, biogas wind power. Reducing economic, regulatory requirements and organizational barriers that make it difficult for plot owners, industry or local authorities to make breakthroughs inside for example energy production/efficiency and environmental improvements industrial position of strength inside the energy sector can support an ambition of being independent of fossil fuels on the long sight.

Center for Bioenergy and Environmental Technology Innovation (CBMI) was established in Central Denmark Region to help businesses and research communities to come together to create new solutions in energy and environment through the use of manure and biomass. CBMI is an Innovation Network under the Ministry of Science and it is formed by six partners: Agro Business Park, Danish Technical University, Faculty of Agricultural Sciences, Aarhus University, Engineering College of Aarhus, Agrotech and Technological Institute. CBMI aims at supporting commercial activities i.e. facilitate improved methods and technologies to utilize the energy and nutrient content in biomass especially manure; identify potentials for unused biomass, both natural and cultured and create national and international market potential for Danish companies. The CBMI do this by generating and managing projects, implementing sectoral and market analysis, coordinating tests and demonstrations of technologies, developing and servicing innovation networking, foster collaboration and professional events, offering communication and knowledge dissemination and assist companies with testing, certification and declarations.

##### **2.1.6.1. Independence of fossil fuels on the long sight**

Central Denmark Development Forum initiated the mega target "Energy and

Environment”. The targets are ambitious and can only be achieved if a wide group of players from the business community, research, municipalities and the Regional Council contribute. Central Denmark Development Forum itself contributes by leading the way with a political leadership and by recommending co-financing to business activities.

With a renewable energy production of 22 percent of the total regional consumption, Central Denmark Region is already above the EU aim for 2020 and close to the national targets for 2020.

The main goals are:

- Maintenance and enlargement of the commercial and technological position of strength;
- increased production and improved utilization of renewable energy (50% renewable energy of total consumption) and
- reduction of the environmental impact.

It is important that the focus on energy and environment is based on the region’s natural resources and on the existing company structure that is based on a majority of SMEs.

#### **2.1.6.2. Increase use of clean energy and energy technology**

Urban regions contribute significantly to the regional CO<sub>2</sub> emission. Therefore it is important that cities implement renewable energy technology and limit the fossil energy consumption.

#### **2.1.6.3. Test and demonstration facilities for renewable energy**

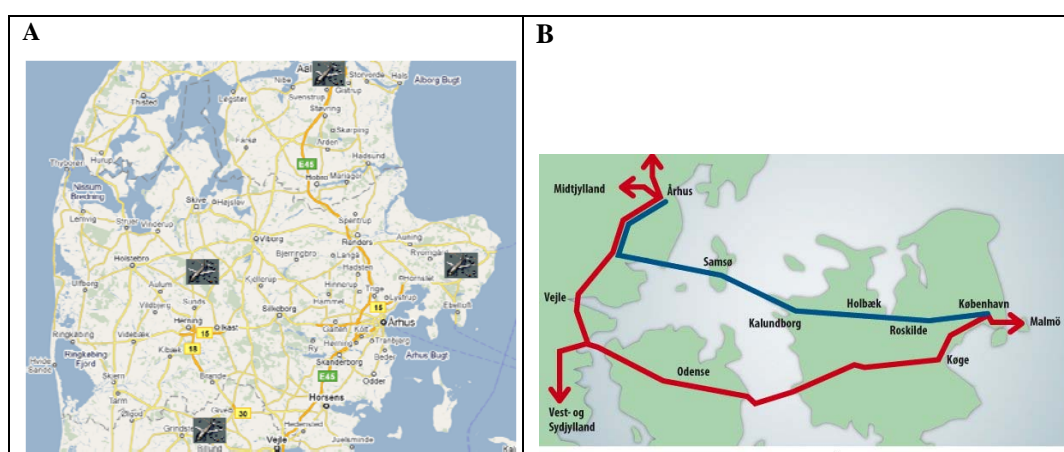
A significant part of the regional potential for renewable energy is rooted in the rural areas. This in particular accounts for wind and biomass production, which occupy substantial areas. Besides the energy production itself the rural area also plays a role when establishing the necessary test facilities as a precondition for continued technological development.

#### **2.1.6.4. Improve sustainability re industrial and energy purposes**

Energy extracted from residual products from agriculture, industry and the service sector. For example wet waste from restaurants and food shops can be collected and transformed to biogas. Manure for energy purposes also has a number of environmental advantages e.g. reduced leaching of nitrate and odour problems

## 2.2. Regional analysis of Central Denmark Region

In this section, the regional analysis of the Central Denmark Region region is presented. The analysis has been carried out mainly by exploring documents at the Central Denmark region Website (<http://www.regionmidtjylland.dk/>) and Statistics Denmark (<http://www.dst.dk/HomeUK.aspx>). More specifically are presented: population characteristics, local economic structure, social and cultural characteristics, role of the region, spatial organization, accessibility (transport and telecommunication networks), development perspective etc.



**Figure 3.** Central Denmark Region. A: Four Airports are indicated. The Motorway E45 crosses the region North/South. New Motorways are being built from Aarhus to Herning and from Herning to Vejle. The Eastern part of the region from North of Aarhus and down to Horsens and Vejle is supposed to evolve into a second Danish Metropol. B. This new metropol area should be linked with Copenhagen via a new fasttrain connection via the Island Samsø (blue line).

**Table 1 – SWOT analysis of Central Denmark Region region**

STRENGTHS	WEAKNESSES
<b>ACCESSIBILITY, TRANSPORT AND LOGISTICS</b>	
<p><b>Summary</b>  In the eastern part of the region, the growth zone Aarhus attracts manpower and investments, partly because of the many higher education institutions including university, business school and engineering academy. Aarhus has a local airport and Aarhus is also home to Denmark's largest container port for overseas container transport. In the west, the growth centres around the cities of Holstebro and Herning, where food processing, wood and furniture industry, textiles and clothing, metal and production technology are particular industrial strengths. On the West coast two harbours, Thyborøn and Hvide Sande, are centres for the Fishing industry. For building social cohesion between east and West, the region work to expand the motor ways from est to west, and broad band networks will be made accessible in all regions during the next coming years.</p> <p>The regions's vision for public transport is that in 2030 the region will have a cohesive system featuring close links between municipal and regional routes. The public transport network as a whole will ensure the region's geographical cohesion and the links with the world around it. To achieve this, the region will need a cohesive public transport system that makes it easy for people to get to work and their place of study, and that reduces automobile traffic in urban areas. The regional council will be paying attention to environmental improvements, and will initiate trials of the use of non-fossil fuels in regional buses. The council recommends upgrading rail services, building a light-rail system and making traffic services an integrated part of residential and commercial district planning. The Regional council work towards establishing a circle line for high-speed trains between Copenhagen-Kattegat-Aarhus-Odense-Copenhagen, that will link the two Danish growth metropolis together</p>	
Easy access to transport via the sea via harbours at the two costlines – East (Thyborøn and Hvide Sande) and West of the region (The main city Aarhus and Grenå).	Slow public transport for those who commute between cities over longer distances to work as well as education
Four airports in the region or at the border of the region: Karup Airport supporting the central and west part of the region and Aarhus Airport supporting the East part, Billund Airport, South and Aalborg supporting the South	Increase in cars and trucks slow down traffic
	A general problem of rising costs and declining revenues.
	More attractive jobs for well educated people must be created to get people to move into rural areas and even from the university city Aarhus to some of the other medium size cities in the region.

AGRICULTURE, AGRIFOOD SECTOR	
<p><b>Summary</b></p> <p>The agricultural sector in Central Denmark Region is moving towards less but bigger farms. At the same time there has been an increase in number of farms and in the area of Organic farming. During the Financial crises, the sales of organic products were lowered by appr. 10%</p> <p>The Central Denmark Region has strong business sectors in Food, Energy, textiles and furnitures. Even a high degree of outsourcing of manuyal work to especially Asia, the sectors are still strong. There is a large Agricultural- and food production (appr. 11.000 food-related business in the region). The food sector is global oriented (123 billion Dkr, 23 % turnover). There are strong economic clusters of Food industry. Several companies put attention on organic farming e.g. Thise Mejeri (milk, cheese processing), Friland (is committed in organic production. Processing organic meat since 1992. Is a sales company owned by Danish Crown (co-operative abattoir), Tange Frilandgartneri International Centre for Research in Organic Food System</p>	
The industries are highly adaptable in relation to new requirements and changed conditions	
The industries are characterised by high production efficiency	Production is characterised by a high national cost level
The industries are integrated into the global economy	The industries are experiencing a decline in efficiency as a result of a lack of innovation and development
Capacity for greater exploitation of a growing market for quality products, food safety, etc.	The industries are facing a growing economic burden as a result of environmental regulation
The industries consider nature and the environment, including via the production of environmentally friendly raw materials and protecting drinking water	Unstable markets re climate issues, rising energy prices, financial crises etc.
The industries are characterised by diversified production, including the involvement of recreational and natural assets	
A public-private partnership exists to counteract the impact on nature and the environment caused by the industries	

ENVIRONMENT AND TERRITORY	
<b>Summary</b>	
The challenges in the area of environment and nature for the region will be to implement Aquatic Environment Plan III and maintain the results from previous plans. Other task will be to maintain the positive development concerning agriculture's impact on the countryside, nature and environment, including by contributing to implementing The Pesticide Plan, The Natura 2000 directives and the EU's 2010 biodiversity objective, The Water Framework Directive, the Woodland objectives and the fulfilment of the Kyoto Protocol	

ENERGY	
<p>The Central Region Denmark has a strong business cluster in Bioenergy. With a renewable energy production of 22 percent of the total regional consumption, Central Denmark Region is already above the EU aim for 2020 and close to the national targets for 2020. Center for Bioenergy and Environmental Technology Innovation (CBMI) was established in Central Denmark Region to help businesses and research communities to come together to create new solutions in energy and environment through the use of manure and biomass.</p> <p>In Herning Research park, which is part of Aarhus University, lies Denmark's first test centre for hydrogen technologies. It is involved in the development and rollout of fuelling facilities, so that in a few years' time it will be possible to tank up a hydrogen car throughout Jutland. These will include large mowers and other vehicles where the absence of noise and pollution make it attractive to use hydrogen as a fuel.</p> <p>South of Horsens is the world's first plant producing 2nd generation biodiesel. This means that instead of producing biodiesel from food (1st generation), it is made from waste – in this case offal from abattoirs. In Foulum near Viborg is one of the world's largest test plants for biogas. In addition to traditional gasification of slurry from pig production, innovative projects are under way – for example using biomass cut from a in the interests of water flow, as feedstock. In that way, nature conservation and renewable energy form a synthesis. The project also provides residues that can be used as fertilizer on fields.</p> <p>The CO2 neutral island of Samsø. The island with its approx. 5,000 inhabitants has received much publicity in the international press in recent years. An offshore wind farm produces more electricity than the island uses. The surplus more than offsets the island's consumption of fossil fuels like heating oil and gasoline. And on land, use is made of solar heating, biofuels and wind turbines.</p> <p>The Danish Bioenergy plant "Maabjerg BioEnergy" is now about to become a reality. The plant will be situated outside Holstebro in the Western part of Denmark Maabjerg BioEnergy is supported by a board, a range of local heat suppliers, and most importantly a group of 200 local farmers who will be supplying the plant with the necessary manure. The Plant will convert 500 000 tonnes of biomass into clean energy - heat and electricity and produce an annual 18.4 million cubic meters of biogas. The total investment is 375 million. Dkr. It will reduce the climate impacts of 50,000 tonnes of CO2 per year, reduce nitrogen and phosphorus in water with 109 and 311 tons per year. The Socio-economic gain will be 1 billion. Dkr and it will preserve 300 jobs in agriculture and Food Business in the local area</p> <p>On energy, the Central Denmark Region has a particularly strong position, with some of the world's largest wind turbine manufacturers such as Vestas Wind Energy A/S and Siemens Wind Power A/S located in the region. Since 1997, the island of Samsø has been Denmark's sustainable energy island, while the latest hydrogen technology is being developed in the western part of the region.</p>	
The emission of CO2 per capita is lower in the Central Denmark Region than in the rest of Denmark and several of the municipalities in the region have ambitious goals in minimising the emission further, for example is the goal of the City of Aarhus to be CO2-neutral in 2030.	

<b>CULTURAL HERITAGE</b>	
Central Denmark Region attracts tourist mainly on the west coast and along regions on the east coast. The cultural and nature values of the region could play a more important role in development of the region as being a part of an Experience economy to enhance the tertiary sector, increase of the quality of production, and more generally contribute to a widespread higher quality of living especially in the areas outside Aarhus.	

<b>TOURISM AND TRADE</b>	
The landscape of Central Denmark Region is very varied, from the North Sea and its dunes in the west and beautiful lakes in the lake highlands to attractive bays and idyllic inlets in the eastern part of the region. The region also offers a broad range of cultural attractions, from the internationally recognised art museum Aros in Aarhus to a medieval festival and large-scale concerts featuring international names in Horsens, living-history events at Hjerl Hede Open Air Museum and fantastic experiences at Aqua in Silkeborg, the Kattegat Centre in Grenaa and Randers Rainforest Tropical Zoo.	
<b>INDUSTRY</b>	
Central Denmark Region has great growth and development potential. The region has a vibrant economic life, strong competencies in knowledge environments, research and education, and rapid population growth. The region thus accounts for almost a fourth of the total Danish workforce.	
In the eastern part of the region, the growth zone Aarhus attracts manpower and investments, thanks partly to the numerous institutions of higher education, which include the university, business school and engineering academy. Aarhus also has Denmark's largest container port for overseas container transport. In the west, the growth centres around the cities of Holstebro and Herning are particular industrial strengths, with food processing, wood and furniture industries, textiles and clothing, metal and production technology.	
<b>INNOVATION, RESEARCH AND TECHNOLOGY TRANSFER</b>	
There are several innovation industries spread in the region and the region policy supports further education in rural districts and more collaboration between region industries and Aarhus universities and other higher education institutions	
Local networks and Clusters have been established for “Branding” – even out of the region – local quality products and experience economies.	
Examples of multinational companies helping small innovative SME's. (Danish Crown/Friland)	





TERRITORIAL COOPERATION	
The EU-financed Objective 2, Objective 3 and Rural Development programmes provide opportunities for close cooperation with national authorities and other organisations in neighbouring countries. The region seeks to take advantage of all the development opportunities open to the region, and of all the relevant programme areas.	
Central Denmark region is involved in European networks and projects for innovation and competitiveness	Technology and human resource transfer from High tech Universal area in East to West is not good enough
Regional infrastructure and organisation like Growth Forum and LEADER groups is well established	

OPPORTUNITIES	THREATS
ACCESSIBILITY, TRANSPORTS AND LOGISTIC	
Competence boost in the food industry sector. Attractive jobs for well educated people outside Aarhus	The income development of the industries seems to be stagnating as a result of globalisation and international competitive pressure
Strangthen the regional University's regional engagement	
AGRICULTURE, AGRIFOOD SECTOR	
Exploitation of growing international market for animal products	High quality competitors from other parts of the world
Exploitation of growing market for quality products, Organic food and food safety, etc	Bigger farms and Intensive agricultural production will change the landscape
Promotion of continued innovation, product development and new technology	High proportion of biomass production (willow, Miscantus and other crops) will have negative influence on nature and biodiversity in some areas
Increased diversification of the industries' earning potential	Outsourcing of manual workplaces in the sector will have negative influence on innovation
Continued development of recreational assets and nature management	Extensification in some areas can lead to of overgrowth (shrubs and woodland) of natural habitats and have a negative influence on biodiversity
Increase the contribution of agriculture to nature (biodiversity) and to the quality of life in the countryside	The dilemmas of successful organic farming e.g. subsidiarity, principle in conflict with export
Continued promotion of environmentally and naturally sustainable production through specific development projects and regulation	The governments Green Growth strategy puts environmental pressure on aggriculture
Climate change will make it possible to grow new crops, Maize, Sunflower, Soybeans	The developing of quality production will not always turn into higher income and more jobs value regarding income and job

<b>ENVIRONMENT AND TERRITORY</b>	
Generally the extensive stretches of undeveloped land – with all their diversity – in the rural districts represent a special kind of potential for new growth.	Need to invest heavily in the infrastructure – both physical and digital – is equally important, as is good public transport
Coordinate a sustainable primary food production with environmental, energy and climate policy (Green Growth)	
<b>ENERGY</b>	
The countryside provides the kind of large areas needed to produce sustainable energy for the region.	National and EU policy is setting the economic frame if biomass production is economic or not
<b>TOURISM AND TRADE</b>	
Opportunities for recreation and the many holiday homes in the rural districts make tourism an important business in rural areas.	Too few very big tourism attractions in central and western part of the region (like Legoland in South Region Denmark and the Old city in Aarhus)
<b>INDUSTRY</b>	
Combined with research and knowledge centres in the towns and cities, agriculture and food production form a value chain that comprises one of the region's opportunities.	
Further develop local networks and Clusters for "Branding" – even out of the region – local quality products and experience economies	
<b>INNOVATION, RESEARCH AND TECHNOLOGY TRANSFER</b>	
Existence of Aarhus University and other educational institutions and several big food industries and food industry clusters strengthen cooperation between primary producers, food companies, consultancy, research and innovation. Key words: Differentiation, innovation and competence	
<b>HUMAN RESOURCES AND OCCUPATION</b>	
Increase of foreign immigration	Loss in social cohesion, if immigrants are not well integrated in local societies

### 2.2.1. Population

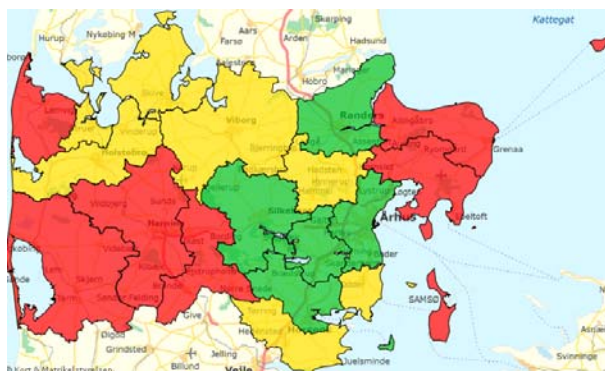
The age distribution in Central Denmark region is quite similar to the other regions in Denmark. Approximately 60% of the population is between 20-64 years old. The population 65+ is currently 16.2%, (fig. 4), expected to increase in the future. The expected relative population increase 2007-2040 is relatively higher for Central Denmark Region compared to other regions in Denmark (fig. 6)

Region	0-14 years	15-19 years	20-64 years	65+ years
Capital Region of Denmark	17.8	5.2	62.3	14.6
Sealand Region	18.9	6.0	59.0	16.1
Region of Southern Denmark	18.9	6.3	58.7	16.2
Central Denmark Region	19.4	6.2	60.0	14.4
North Denmark Region	18.3	6.3	59.9	16.5
Entire Country	18.6	5.9	60.1	15.3

Source: Statistics Denmark

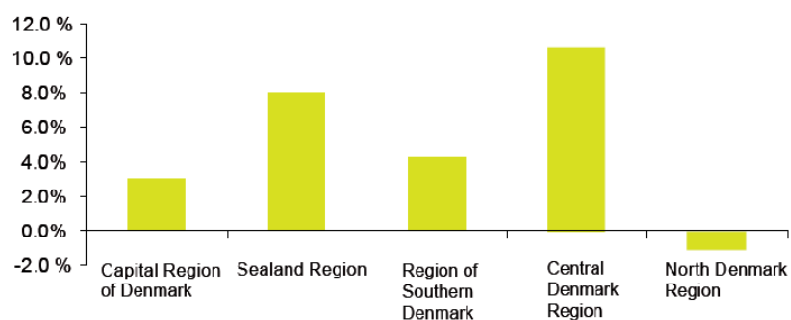
**Figure 4.** Age distribution in percent, January 2007

In the eastern part of the region, the growth zone Aarhus attracts manpower and investments, partly because of the many higher education institutions including university, business school and engineering academy. Aarhus has a local airport and Aarhus is also home to Denmark's largest container port for overseas container transport. Municipalities close to Aarhus has the largest citizens per km<sup>2</sup> (Fig. 5).



**Figure 5.** Citizens per km<sup>2</sup>. Red: < 64, Yellow: 65 – 96, Green: >96

### Expected relative population increase 2007-2040



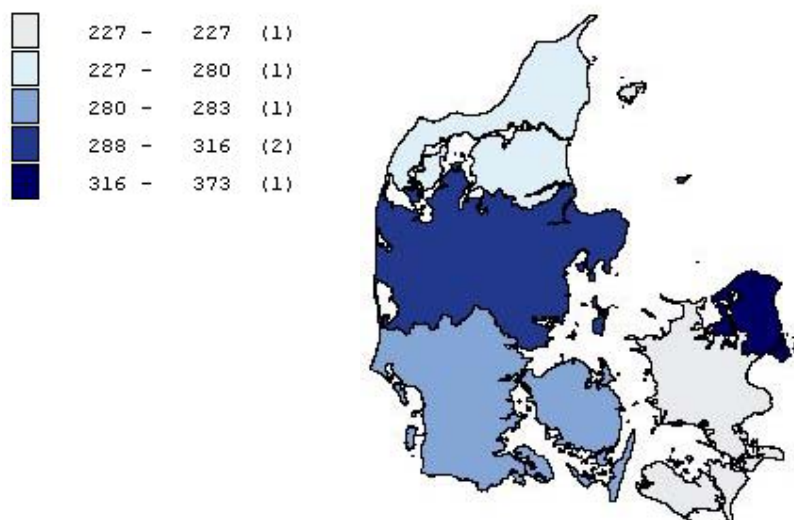
Source: Statistic Denmark

Note: Significant differences in the expected population growth in the individual regions may occur

**Figure 6.** Expected relative population increase 2007-2040

### 2.2.2. Economy

The GDP per Capita for Central Denmark Region was the second highest in Denmark in 2008 (fig 7.)



**Figure 7.** GDP per capita (DKK 1000) by price unit, type, time and region, 2008. Source: Statistics Denmark

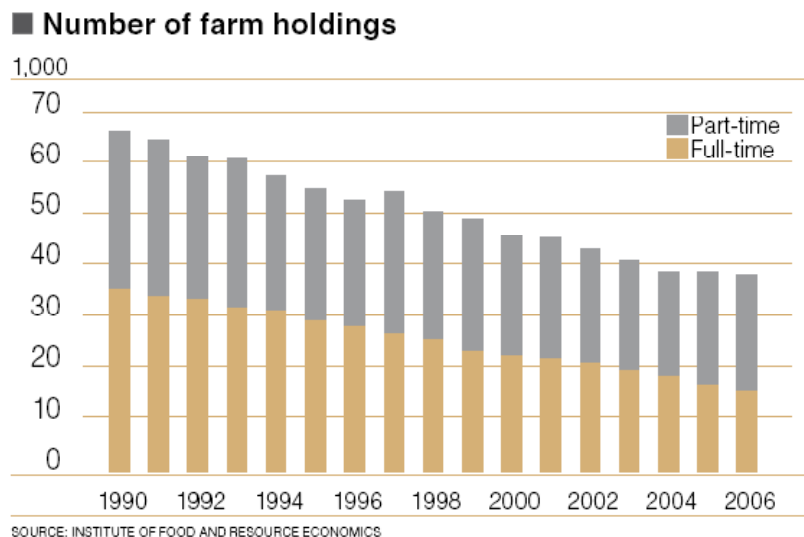
### 2.2.3. Economy trade and industry

The main industrial sectors and clusters in terms of workplaces ranked are the trade and service sector; industry and agriculture. 23% of the country workplaces are

placed in the region which means 612,000 workplaces by and large. Business service, building and construction industry and hotel restaurant business are the most rapid expanding industry with a growth of 26%. Traditional industry such as textile and leather; wood and furniture and agriculture are the far most declining industries - 63%. To mention some of the companies in the region it will include TDC phone company, APV, Pressalit, Grundfos, Vestas, Tulip, Danish Supermarket and Arla Foods. Key R&D institutions are the University of Aarhus, as well as the research park 'Katrinebjerg' adjacent to the university, which is home to young start-ups and small and me-dium-sized R&D enterprises.

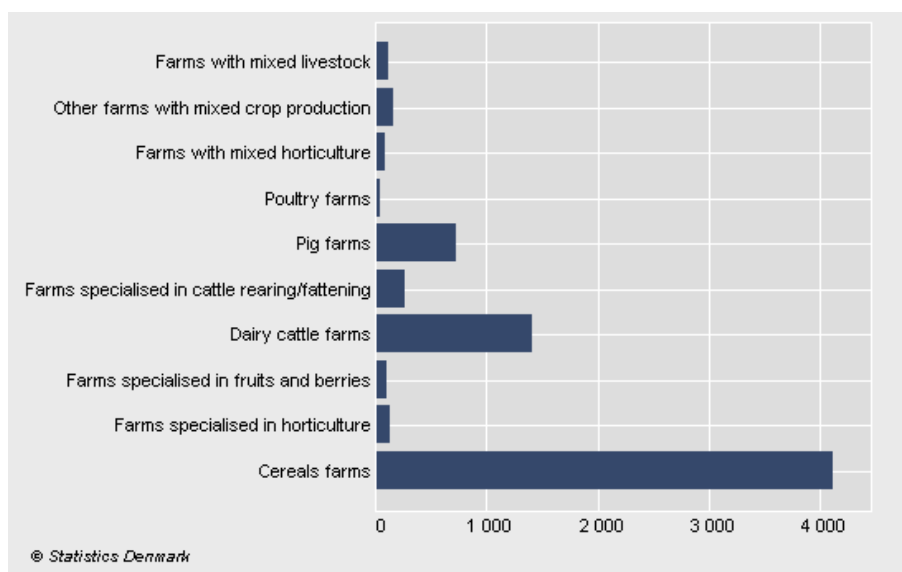
#### 2.2.4. Primary sector: Agriculture

The number of farm holdings in Denmark is decreasing for full time farmers (fewer but bigger). The bnumber of part time farmers has stabilized during the last 10 years (fig 8)



**Figure 8.** Number of farm holdings – divided into part-time and full-time during the period 1990 to 2006

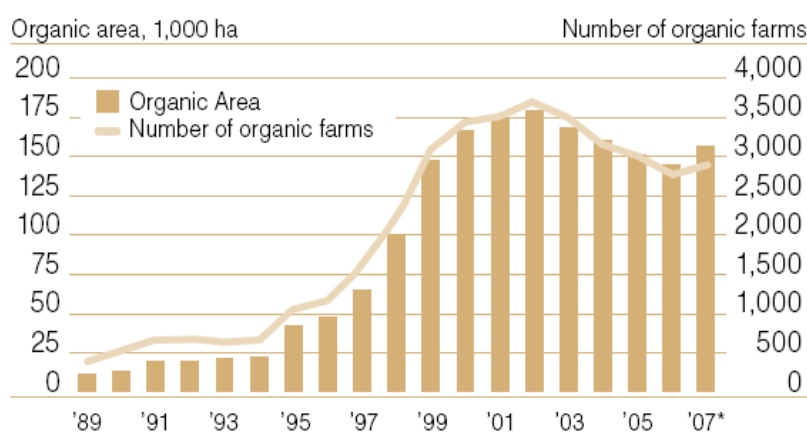
Comparing different farm types, cereal farms, Dairy cattle farms and pig farms are most abundant (fig. 9)



**Figure 9.** Number of different farm types in in Central Denmark Region 2008.

The area and number of organic farms in Denmark has been increasing since the mid 1990s and is now stabilized at approximately 150.000 ha on approximately 3000 farms. The Organic area in percent of the total agricultural area is 5,46 % for Denmark compared to 18,08% for Italy, 3,78% for the UK and 5,11% for germany Danish politics support a further increase in the organic area via its Green Growth strategy.

#### ■ Development in the Number of Organic Farms and the Organic Area



\*The 2007 figures are forecasts made by Danish Agricultural Advisory Service, National Centre

SOURCE: THE DANISH PLANT DIRECTORATE

**Figure 10.** Development in the number of organic farms and the organic area 1989 to 2007

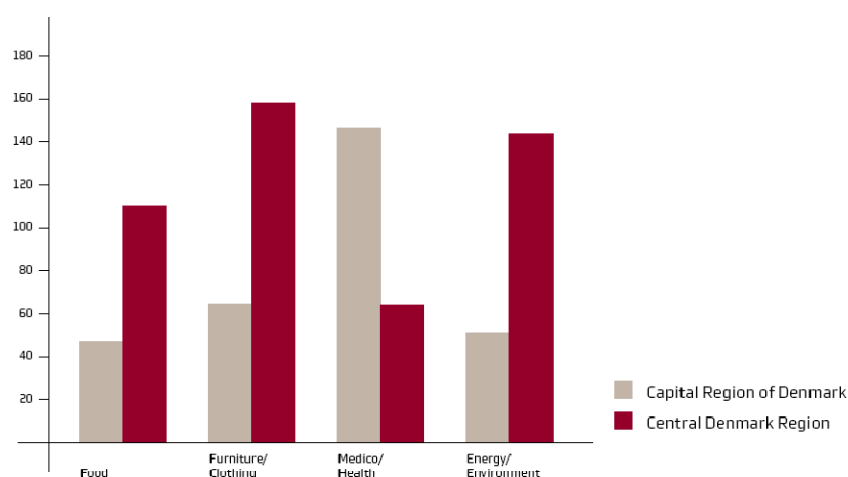
The region comprise a range of holdings with non agricultural activities, such as fur animals, handcraft, sales of renewable energy, farms shops etc. (Table 2)

**Table 2.** Holdings in Central Denmark Region with non agricultural activities in 2007

Activity	Number of holdings
Agricultural service	1 440
Fur animals	275
Agro tourism	121
Handcraft	371
Processing of agricultural products	94
Sales of renewable energy	323
Farm shops	322
Riding schools	81
Other farms with non agricultural activities	546
All farms with non agricultural activities	3 046

#### Index for Private Employment Specialisation, 2004

Index figures (100 = national average)



**Figure 11.** Index for Private Employment Specialisation, 2004. Comparison between Central Denmark Region and Capital region Denmark.

Central Denmark Region is recognised by a relatively high employment specialization in the sectors Furniture/clothing, Food industry and Energy/-



Environment compared to the Capital region. The sector of Medicin/Health is on the other hand bigger in the Capital Region than in the Central Denmark Region

#### 2.2.4.1. Secondary sector: Energy sector



Central Denmark Development Forum initiated the mega target “Energy and Environment”. The targets are ambitious and can only be achieved if a wide group of players from the business community, research, municipalities and the Regional Council contribute. Central Denmark Development Forum itself contributes by leading the way with a political leadership and by recommending co-financing to business activities.

With a renewable energy production of 22 percent of the total regional consumption, Central Denmark Region is already above the EU aim for 2020 and close to the national targets for 2020.

The main goals are:

- Maintenance and enlargement of the commercial and technological position of strength;
- Increased production and improved utilization of renewable energy (50% renewable energy of total consumption) and
- Reduction of the environmental impact.

It is important that the focus on energy and environment is based on the region’s natural resources and on the existing company structure that is based on a majority of SMEs. Central Denmark Development Forum plans to manage its measure through a number of broad but yet specific targets. The overall targets are ambitious and can only be met if a large number of players contribute.

## Biomass

Biomass is the largest source of renewable energy in the world and in Denmark too. The selection of the most suitable technology is strongly dependent on local conditions including raw material availability. The future economy of the different processes will depend on how successful the technological development will be, but also on the tax and duty policy applied by the government at the time and on the development in the price of both biomass and fossil fuels. Therefore, there is no single obvious best technology. The environmental benefits and maximum energy yields achieved depend not only on the conversion technology chosen but equally on the choice of raw material or cropping system used to produce the raw material. As an example the utilisation in biogas plants of grass from permanent lowland pastures could remove nutrients from river valleys and thus contribute to a cleaner aquatic environment. The energy yielded in the biogas process is not as high as with direct combustion of the biomass, but burning the remaining fibre fraction after degasification increases the energy yield and reduces nitrate leaching from agricultural land as the fibre fraction is not returned to the soil. A third example on the effect of cropping system is that on the basis of the same amount of energy produced by the growing of perennial energy crops (for example willow and miscanthus) instead of annual cereals will significantly reduce the total emission of greenhouse gases, while also reducing nitrate leaching. The net energy yielded with a biomass production is highly dependent on the crops used and on exactly which product is regarded as the end product of the biomass. As a rough estimate the following net energy yields can be achieved (energy consumption for cultivation and conversion has been deducted) for a production of:

- willow woodchips or wholecrop cereals 150 GJ/ha
- biogas from grass-clover 60 GJ/ha
- ethanol and lignin<sup>3</sup> from wholecrop cereals 45 GJ/ha
- ethanol from wheat grain 20 GJ/ha
- rapeseed oil or biodiesel 15 GJ/ha

<sup>3</sup> Lignin is extracted during the process and its energy content utilised in combustion.

Technologies, which are deemed suitable for a decentralised utilisation and have a greater chance of technological breakthrough within a shorter space of time, may be of interest from a regional development perspective. These technologies may, for example, be biogas, Stirling engines and the utilisation of raw rapeseed oil. By good

integration in local structures and with agricultural and environmental aspects, a number of derived benefits can be achieved that will be able to more or less outweigh the large-scale and high-tech advantages of the 'large' technologies.

The commercial sector in Central Denmark Region specialises in the manufacture of foods, clothing and furniture and also in energy and the environment. The latter area, combined with the medical and health areas, are those exhibiting the strongest growth in Denmark. There is thus a large potential in Central Denmark Region for further development of the energy and environment sector, not least in close collaboration with the food sector, so that the stricter environmental regulations in agriculture can be met in an innovative and cost-effective way.

An analysis of the biomass potential in Central Denmark Region and at national level shows that the current utilisation of biomass from forests and agriculture of, respectively, 16 and 50 PJ, can be increased to, respectively, approx. 45 and 147 PJ without compromising the main role of agriculture as a food producer and forestry as a timber producer. The analysis of the potential increase of the biomass production from agriculture alone shows a current utilisation of approx. 7 PJ in Central Denmark Region and 24 PJ for the country as a whole, which can be increased to, respectively, 34 and 115 PJ, corresponding to a nearly five-fold increase in the utilisation of biomass. The agricultural sector in Central Denmark Region is thus on its own able to deliver more biomass for energy than the total Danish agricultural sector currently produce.

The Central Denmark Region is especially strong in the energy and environment sector. New initiatives focusing on sustainability are launched every year. The world's largest test plant of biogas was opened in October 2007 at Aarhus University, Research Centre Foulum east of Viborg. The purpose being to improve utilization of biogas as well as lessening the impact on the environment and climate. In Brædstrup near Horsens 8,000 square metres are covered with solar panels that produce inexpensive power and sustainable heating for the local district heating consumers. This plant is the largest in the world and with support from Central Denmark Region among others it will begin experimenting with providing sustainable energy to a future, large housing estate. Samsø, the renewable energy island of Denmark, has been energy self-sufficient since 2003, this includes offshore and onshore wind energy turbines. Next step is a more intelligent use of energy resources. The Danish Bioenergy plant "Maabjerg BioEnergy" is now about to become a reality. The plant will be situated outside Holstebro in the Western part of

Denmark. Maabjerg BioEnergy is supported by a board, a range of local heat suppliers, and most importantly a group of 200 local farmers who will be supplying the plant with the necessary manure. The Plant will convert 500.000 tonnes of biomass into clean energy - heat and electricity and produce an annual 18.4 million cubic meters of biogas. The total investment is 375 million. Dkr. It will reduce the climate impacts of 50,000 tonnes of CO<sub>2</sub> per year; reduce nitrogen and phosphorus in water with 109 and 311 tons per year. The Socio-economic gain will be 1 billion. Dkr and it will preserve 300 jobs in agriculture and Food Business in the local area

## 2.3. Role of the Region

### 2.3.1. Role of the region

A main regional task includes the health sector, phyciathry and social care and regional development. The tasks of regional development is to strenghten development and growth within the areas of business, employment, education, innovation, nature & environment, tourism, rural districts, culture and international relations. The public administration in the region employs 25.000 and the health sector employs 34.000 workers.

### 2.3.2. Physical-geographical characteristics of the region

Central Denmark Region is located in Mid Jutland on Denmark's mainland from the west coast (Vesterhavet) to the east Coast (Kattegat), which is approximately 200 km from coast to coast - seen from the outside world better known as part of the North Sea area. The region covers an area of 13.142km<sup>2</sup> and is inhabited by 1.2 million people. The largest city is Aarhus situated at the east coast with 282,000 inhabitants, representing the economic and educational centre of the region.

### 2.3.3. New political and administrative structure

A totally a new political, administrative and geographical structure for the entire country was launched in 2007. Under the new structure Denmark is divided into five regions and 98 municipalities. The political council and central administration of Central Denmark region is located in Viborg. The key innovation support providers in the region besides the political decision-makers and the association "Forum for Growth" (Vækstforum), are actors in industry, business and the labour market, plus R&D centres in research and education and research and technology. The University of Aarhus is by far the largest research and higher education centre in the region. Several national research centres have recently been merged with the University of Aarhus such as the Danish Institute of Agricultural Sciences which has become the Faculty of Agricultural Sciences in cooperation with Bygholm Agricultural College;

The National Environmental Research Institute and The National Food Institute and the Aarhus School of Business.

The “Forum for Growth” launched its first overall Regional Industrial Development Strategy and Action Plan which is the basis for an agreement with the Danish government. The aim of this agreement is to ensure coherence between the national government’s globalisation strategy and the Forum for Growth Regional Industrial Development Strategy.

### **3. Part III – Regional Development Scenarios for the CDR – Assessment of Scenarios (D6.2)**

In this part, which corresponds to Deliverable 6.2, Regional Development Scenarios are presented for Central Denmark Region aiming at serving the objectives set; the building process of these scenarios is also explained. By combining the goal and objectives of the Central Denmark Region case study, together with the in depth analysis of the region, certain hypotheses can be formulated in respect to its future developments. The construction of the Central Denmark Region regional development scenarios is based on these hypotheses. The building process and the scenarios developed in this context are presented in the following

#### ***3.1.The Scenario Building Process***

In this section the scenario building process will be described.

First, the hypotheses set in the scenario building process are presented, and are referring to the following features of the system at hand:

- i. **Population distribution patterns:** The present hypothesis focuses on the uneven distribution patterns of the Central Denmark Region population (via eastern part and thinning western). In such a framework, the possible future outcomes of this hypothesis are referring to two distinct future developments:
  - a) Population distribution patterns remain unchanged, with urban regions (especially the east coast) attracting large parts of the population (urbanization). The labourforce stay in the countryside in commuting distance to the urban centers. Wide spread condemnation of abandoned houses in the open and dying villages, resulting to a more homogeneously distributed population pattern, , characterized by a strong interaction between rural – urban areas.
  - b) Revitalisation of rural areas where infrastructure (educational and cultural

activities) has been strengthened in remote areas creating better conditions for development in medium sized towns and rural villages.

- ii. **Agri-sector:** the hypothesis is focusing on the priorities set by the primary agricultural sector; in this sense, two possible future outcomes are considered:
  - a) Increase in agri-food sector's efficiency, with regards to environmental benign production of high quality primary products for further industrial manufacturing in the region and for export. User driven innovation with focus on healthy food. Landscapes are characterized by industrial production (homogenous).
  - b) Nice agri-food production, rediscover traditional food production and food culture which is branded and sold on domestic and international markets as high value products. People and business are deeply involved in the local agenda work.
- iii. **Manufacturing:** two hypotheses were considered in respect to the locational pattern of the manufacturing sector, namely:
  - a) Manufacturing is industrialized and concentrated in certain poles mainly concentrated around major cities and in particular on the east coast of the region. Manufacturing is export oriented. The labour force commutes from rural areas.
  - b) Manufacturing is more scattered with several SME's and small businesses located across the region and not only around the major cities on the east coast. Manufacturing is both domestic and export oriented.
- iv. **Tourism:** Tourism is considered an industry that can boost the economy and attract resources to the region. Two paths were considered:
  - a) Existing urban and coastal tourism has been strengthened by branding the landscape values that are preserved in nature reserves.
  - b) Development of tourism in rural areas (agr-eco tourism) with high landscape and cultural values and strengthening urban and coastal tourism by creating a better interplay between all three forms of tourism. Development of international experience attractions and all-year tourist destinations.
- v. **Agro-Food technology:** This hypothesis refers to the innovation diffusion in the agricultural and food production sectors. The primary production and food industry is already quite high-tech due to the high labour costs in DK, despite this fact more and more labour intensive downstream bulk production (cereal and pig production and slaughterhouses in particular) are moving to countries with lower costs. The future developments considered in this hypothesis are as follows:
  - a) Continued cost reduction through technology development and decreased labour costs. Industrialized production of food.

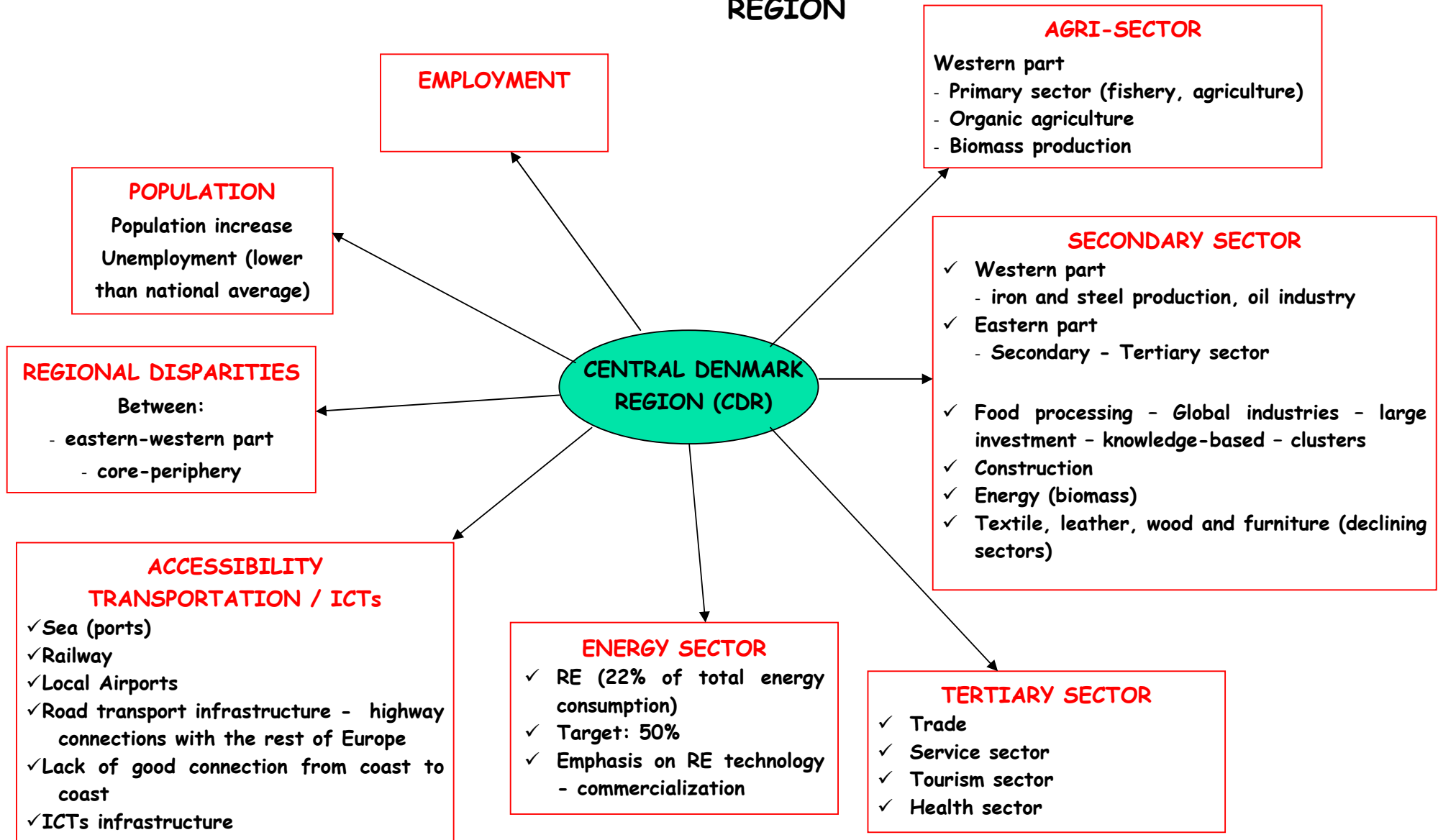
- b) Renewal and innovation inside high value local products
- vi. **ICTs:** It refers to the level of adoption and use of information and communication technologies (ICTs) in the area of concern, aiming at the diffusion of knowledge and information in respect to technological innovations in the agricultural sector, new developments in the CAP, opportunities for cooperation, developments in agricultural markets etc. The possible future developments considered for this hypothesis are:
  - a) High ICTs's exploitation in urban areas - medium in rural
  - b) High level of ICTs's exploitation i all areas
- vii. **Energy (Renewable Energy Sources):** The agricultural sector can significantly contribute to the energy production through the processing of biomass that is derived from the sector's waste or from energy crops, as well as forest management. The possible future developments in respect to the "energy" hypothesis are:
  - a) Medium dependence on fossil fuels, medium share of central produced renewable energy (high volume biogas plants and very big wind turbines);
  - b) High share of renewable energies and increased energy efficiency. Both local (biogas) and centralized production of energy. windturbines).

Key aspect of scenarios is high quality (either for increasing efficiency without negative consequences for the environment through technology development or for creating new high value products based on regional cultural enheritance). The scenarios developed are:

- **S1 Scenario:** *"High tech Central Denmark Region: Economy to scale"*;
- **S2 Scenario:** *"Nature matters"*;
- **S3 Scenario:** *"Revitalization of the Central Denmark Region rural region: vial rural regions"*.

Below is given the rationale of the scenarios as different combinations of hypotheses for Central Denmark Region.

# KEY ELEMENTS OF THE PRESENT SITUATION IN THE CENTRAL DENMARK REGION





**Table 3.** Description of Scenario 1 to 3

Scenario 1: AGRI-FOOD HIGH TECH	Scenario 2: NATURE MATTERS	Scenario 3: REVITALISATION OF RURAL REGIONS
Efficiency and economy to scale	Nature matters	Vital rural regions
<p>Population distribution patterns remain unchanged, with urban regions (east coast) attracting large parts of the population (urbanization). Labour commute from near rural areas. Wide spread condemnation in abandoned remote rural areas.</p> <p>Increase in agri-food sector's efficiency, with regards to environmental benign production of high quality primary products for further manufacturing in the region and for export</p> <p>Manufacturing is concentrated in certain poles mainly concentrated around major cities and in particular on the east coast. Manufacturing is exportoriented</p> <p>Existing urban and coastal tourism has been strengthened by branding the landscape values preserved in nature reserves</p> <p>Continued cost reduction through technology development and decreased labour costs</p> <p>High ICTs's exploitation in urban areas - medium in rural</p> <p>Medium dependence on fossil fuels, medium share of central produced renewable energies</p>	<p>Population distribution patterns remain unchanged, with urban regions (east coast) attracting large parts of the population (urbanization). Labour commute from near rural areas. Wide spread condemnation in abandoned remote rural areas.</p> <p>Increase in agri-food sector's efficiency, with regards to environmental benign production of high quality primary products for further manufacturing in the region and for export</p> <p>Manufacturing is concentrated in certain poles mainly concentrated around major cities and in particular on the east coast. Manufacturing is exportoriented</p> <p>Development of tourism in rural areas (agro-eco tourism) strong interplay between coastal, urban and agro-eco tourism. Development of international experience attractions and all-year tourist destinations</p> <p>Continued cost reduction through technology development and decreased labour costs</p> <p>High ICTs's exploitation throughout the region</p> <p>High share of renewable energies and increased energy efficiency</p>	<p>Revitalisation of rural areas with strong infrastructure (educational and cultural activities) Condemnation, resulting to a more homogeneously distributed population pattern</p> <p>Nice agri-food production, placing emphasis on local produce and manufacturing of high value nice products. People and business are deeply involved in the local agenda 21 work</p> <p>Manufacturing is scattered with several SME's and small businesses located across the region coast. Manufacturing is exportoriented</p> <p>Development of tourism in rural areas (agro-eco tourism) strong interplay between coastal, urban and agro-eco tourism. Development of international experience attractions and all-year tourist destinations</p> <p>Renewal and innovation inside high value local products</p> <p>High ICTs's exploitation throughout the region</p> <p>High share of renewable energies and increased energy efficiency</p>

DOMAINS	VARIABLES	HYPOTHESES	
REGIONAL STRUCTURE	POPULATION	Population distribution patterns remain unchanged, with urban regions (east coast) attracting large parts of the population (urbanization). Labour commute from near rural areas. Wide spread condemnation in rural areas <b>S1</b> , <b>S2</b>	Revitalisation of rural areas with strong infrastructure (educational and cultural activities) <b>S3</b>
	AGRI-SECTOR	Increase in agri-food sector's efficiency, with regards to environmental benign production of high quality primary products for further manufacturing in the region and for export <b>S1</b> , <b>S2</b>	Nice agri-food production of rediscovered traditional food production and food culture which is branded and sold on domestic and international markets as high value nice products. <b>S3</b>
	MANUFACTURING	Manufacturing is concentrated in certain poles mainly concentrated around major cities and in particular on the east coast. Manufacturing is export oriented <b>S1</b> , <b>S2</b>	Manufacturing is scattered with several SME's and small businesses located across the region coast. Manufacturing is export oriented <b>S3</b>
	TOURISM	Existing urban and coastal tourism has been strengthened by branding the landscape values in preserved in nature reserves <b>S1</b>	Development of tourism in rural areas (agro-eco tourism) strong interplay between coastal, urban and agro-eco tourism. Development of international experience attractions and all-year tourist destinations <b>S2</b> , <b>S3</b>
TECHNOLOGY INNOVATION	AGRITECHNOLOGY FOOD TECHNOLOGY	Continued cost reduction through technology development and decreased labour costs <b>S1</b> , <b>S2</b>	Renewal and innovation inside high value local products <b>S3</b>
ICTs	ICTs	High ICTs's exploitation in urban areas - medium in rural <b>S1</b>	High level of ICTs's exploitation in all areas <b>S2</b> , <b>S3</b>
ENERGY	ENERGY PRODUCTION	Medium dependence on fossil fuels, medium share of central produced renewable energies <b>S1</b>	High share of central and decentral produced renewable energies and increased energy efficiency <b>S2</b> , <b>S3</b>

**Figure 12:** Set of hypotheses for building scenarios for the regional development of Central Denmark Region.

### ***3.2. Description of Central Denmark Region Regional Development Scenarios***

In the present section, the three Regional Development Scenarios will be detailed.

#### **3.2.1. S1 scenario: “High-tech Central Denmark Region”**

This scenario is the outcome of the following combinations of hypotheses (Table 4), forming the backbone of the scenario:

**Table 4** – Synthetic table of S1 Scenario

Domain	Variable	Hypotheses
Regional structure	Population	Population distribution patterns remain unchanged, with urban regions (east coast) attracting large parts of the population (urbanization). Labour commute from near rural areas.
	Agri-sector	Increase in agri-food sector's efficiency, with regards to environmental benign production of high quality primary products for further manufacturing in the region and for export
	Manufacturing / Services	Existing urban and coastal tourism has been strengthened by branding the landscape values in rural areas
	Tourism	Existing urban and coastal tourism has been strengthened by branding the landscape values that are preserved in nature reserves
Technology and innovation	Agri-technology Food-technology	Continued cost reduction through technology development and decreased labour costs
ICTs	ICTs	High ICTs's exploitation in urban areas - medium in rural
Energy	Energy production patterns	Medium dependence on fossil fuels, medium share of central produced renewable energies

A short description of the S1 scenario is presented below:

### **S1 Scenario: “High tech Central Denmark Region”**

The region is betting on strengthening the agri-food cluster (mainly is concentrated around urban areas on the east coast) that has been an economic locomotive now and in the past. Food production is economic efficient through technological development and labour savings and constantly seeking new products through user driven innovation. There is strong collaboration between knowledge institutions and the industry in order to be competitive on the international market.

The most remote rural areas are abandoned and left to industrial primary production of food, feed, fibre and fuel.

The economic development of the urban areas has a spill over effect on the more vital towns and villages from where the medium to high educated labour force commute to business and industrial areas in the urban areas using efficient public transport and upgraded mainroads.

The demand for standardized quality raw material imply that agriculture is concentrated on fewer but more efficient enterprises delivering high value products to the food industry. Farmland is owned by few but very big share ownerships producing high value crops on fertile farmland for further processing, while less fertile land is either used for energy production (biofuels and wind turbines) or set aside.

The landscape is industrialised (homogeneous) on fertile land, but landscape values are preserved in appointed natural reserves.

A better coordination between urban and coastal tourism has created jobs in near rural areas where the natural reserves are used as an asset.

The energy demanding high tech industrial production is still dependent on fossil fuels although measures are introduced in order to save energy. Renewable energy is centralized in combined heat and power plants, biogas plant and large scale wind turbines. Crops for bioenergy is mainly combusted in the centralized efficient heat and power plants.

Thus tourism is the only significant income source in rural areas since the industrialized agriculture is not denuding labour and of course from commuters working in urban areas. Economic wealth comes from the urban areas and the industrial and service clusters found here.

## S2 scenario: “Nature matters”

This scenario is based on the continuation of past and present trends and is the outcome of the following combination of hypotheses (Table 5):

**Table 5** – Synthetic table of S2 Scenario

Domain	Variable	Hypotheses
Regional structure	Population	Population distribution patterns remain unchanged, with urban regions (east coast) attracting large parts of the population (urbanization). Labour commute from near rural areas.
	Agri-sector	Increase in agri-food sector's efficiency, with regards to environmental benign production of high quality primary products for further manufacturing in the region and for export
	Manufacturing / Services	Manufacturing is concentrated in certain poles mainly concentrated around major cities and in particular on the east coast. Manufacturing is exportoriented
	Tourism	Development of tourism in rural areas (agro-eco tourism) strong interplay between coastal, urban and agro-eco tourism. Development of international experience attractions and all-year tourist destinations
Technology and innovation	Agri-technology Food-technology	Continued cost reduction through technology development and decreased labour costs
ICTs	ICTs	High ICTs's exploitation through out the region
Energy	Energy production patterns	High share of renewable energies and increased energy efficiency

A short description of the S2 scenario is presented below:

### Scenario 2 “Nature matters”

The region is betting on strengthening the agri-food cluster (mainly is concentrated around urban areas on the east coast) that has been an economic locomotive now and in the past. Food production is economic efficient through technological development and labour savings and constantly seeking new products through user driven innovation. There is strong collaboration between knowledge institutions and the industry in order to be competitive on the international market.

Understanding that a industrial agri-food sector puts pressure on both environment and landscape the tendency is towards developing , *Industrial-based agriculture* as an intensive commercial enterprise in which technologies are, first and foremost, utilised with a view to production yield and effective environmental solutions. Since nature values are high on the agenda people and business are deeply involved in the local agenda 21 work. This includes selection of buildings qualified for condemnation.

Farmers located in nature and landscapes of high value are given incentives to manage nature values instead of conventional industrial production of agricultural products.

Because of the intensive agenda 21 work tourism is developing in rural areas (agriteco tourism) with high landscape and cultural values. Simultaneously a strong coordination with urban and coastal tourism has created a better interplay between all three forms of tourism. Development of international experience attractions and all-year tourist destination is also benefiting from this development.

Access to high speed broadband in even the most remote areas of the region is valued service to tourists, and also makes life easier in more remote areas although abandonment of remote villages is a fact.

Decentralises energyproduction in the form of gasification of agricultural and household waste is developing through out the region, and innovative entrepreneurs are strongly supported. Windturbines on the other hand are only allowed in landscapes of low value. Thus tourism and decentralized energyproduction has become a very important source of income in rural areas while food processing and other processing service

### 3.2.2. S3 Scenario: “Revitalization of the Central Denmark Region rural region”

The hypotheses (key elements) of S3 scenario are presented in table 6, forming the backbone for building S3:

**Table 6** – Synthetic table of S3 Scenario

Domain	Variable	Hypotheses (key elements of S3)
<b>Regional structure</b>	Population	Revitalisation of rural areas with strong infrastructure (educational and cultural activities)
	Agri-sector	Nice agri-food production, placing emphasis on local produce and manufacturing of high value nice products. People and business are deeply involved in the local agenda 21 work
	Manufacturing / Services	Manufacturing is scattered with several SME's and small businesses located across the region coast. Manufacturing is exportoriented
	Tourism	Development of turism in rural areas (agro-eco turism) strong interplay between costal, urban and agro-eco tourism. Development of international experience attractions and all-year tourist destinations
<b>Technology and innovation</b>	Agri-technology Food-technology	Renewal and innovation inside high value local products
<b>ICTs</b>	ICTs	High ICTs's exploitation through out the region
<b>Energy</b>	Energy production patterns	High share of renewable energies and increased energy efficiency

### **S3 Scenario: “Revitalization of the Central Denmark Region rural region”**

#### **S3 Scenario: “Revitalization of the Central Denmark Region rural region”**

Revitalisation of rural areas is the central strategy in this scenario. The means is a strong local infrastructure (educational and cultural activities and access to high speed broadband). Local agricultural produce is the basis of a agri-food SME's in rural areas who has rediscovered the local food culture and brand this in innovative fashions on nice markets where the regions strength and distinctive feature are used as assets. The effective agri-food and other industrial sectors are still found around the urban areas where they focus on cost effective production for export, but SME's are much more homogeneous distributed across the region thriving on vital villages and towns that are attractive to live. The population is very aware of the local products and support local business and production, while local produced high value products are exported (wine, beer, cheese etc.).

The nature is not only protected for the benefit for wildlife and plants. It is also used as a resource for the population, tourism and industry. The region is continuously self-sufficient with clean drinking water.

Every village has a small tourist office supporting strong interplay between coastal, urban and agro-eco tourism.

Renewable energy production is widespread (biogas, wind turbines), and local based.

Renewable energy contribute with at least half of all energy consumed in the region. CDR is among the leading regions in research, innovation and application of renewable energy, and will soon be independent of fossil fuels.

Thus primary production, processing of food, consecutive industries and experience attractions are important for maintaining work places in rural areas. The regional position of strength and dynamic labour market is attracting labour from abroad creating an international environment. Nature resources are an important asset in this context.



### ***3.3. Assessment of CDR Regional Development Scenarios***

#### **3.3.1. Short Description of SWOT analysis method**

The so-called SWOT analysis (Strengths, Weaknesses, Opportunities and Threats) is a strategic planning qualitative evaluation tool. It is widely used both in business and research, for hypothetical or existing situations.

Once a clear objective has been identified for the analysed context, the key of a SWOT analysis is establishing the internal and external factors that are important to achieve the goal for which the analysis is carried out. The internal factors are the strengths and weaknesses of the context (which may be a company or a region, for instance), while the external factors are the opportunities and threats, out of the context and not directly manageable, that may be helpful or harmful, respectively, for the context itself in achieving the goal set.

#### **3.3.2. Application of SWOT analysis**

In this section, each of the three above presented Central Denmark Region regional development scenarios are assessed by use of SWOT analysis, based on experts' opinion. The strengths, weaknesses, opportunities and threats of each scenario are presented, taking into account the regional profile (natural, cultural and human resources) of Central Denmark Region, the objectives set for the study region, as described in section 2.1, and the key drivers of each scenario. The general performance of each scenario for the Central Denmark Region is assessed, highlighting the most important outcomes and conclusions of this qualitative assessment.

### 3.3.2.1. SWOT analysis of scenario S1 (“High-tech industrial clusters”)

STRENGTHS	WEAKNESSES
Airports and harbours strategically placed in the region	Traffic congestion in urban areas
More freedom to develop industrialized agriculture in rural areas when the population is concentrated around rural areas	Rising cost in urban areas especially on the east coast
Network and clusters of food industry and others is already in place	Production is characterized by a high national cost level
The larger industrial clusters around major cities of the east part of the region makes it easier for SME to get established, to exploit the infrastructure and to support from their bigger sisters	Labour force needs to get better educated and problems getting labour in rural areas and on the west coast
The industries are highly adaptable in relation to new requirements and changed conditions	Uneven distribution of jobs and wealth in the region – the poor west versus the rich east
The industries are characterized by high production efficiency	
Landscape values across the region	Intensive agriculture puts pressure on the landscape and environment
The industry is well integrated in the global economy and market	
The region is active in collaboration networks with authorities in neighboring countries	
The countryside provides large areas needed to produce renewable energy (wind and biomass)	Wind turbines and biofuel production disfigure the countryside
Strong coordination between sustainable (environmental) primary food production with environmental, climate and energy policy	
OPPORTUNITIES	THREATS
Exploitation of growing international market for food products – especially animal	High competition on international markets
Promotion of continued innovation, product development and new	Bigger farms and Intensive agricultural production will change the landscape

technology	
Continued promotion of environmentally and sustainable production through specific development projects and regulation	High proportion of biomass production (willow, Miscantus and other crops) will have negative influence on nature and biodiversity in some areas
Coordinate a sustainable primary food production with environmental, energy and climate policy (Green Growth)	Labor force too small
The countryside provides the kind of large areas needed to produce sustainable energy for the region	The governments Green Growth strategy puts environmental pressure on agriculture
Short distance between research and knowledge centres agriculture and food production form a value chain that comprises one of the region's opportunities.	The developing of quality production will not always turn into higher income and more jobs value regarding income and job
Strengthen cooperation between primary producers, food companies, consultancy, research and innovation. Key words: Differentiation, innovation and competence	Need to invest heavily the infrastructure – both physical and digital – is equally important, as is good public transport
	National and EU policy is setting the economic frame if biomass production is economic or not
	Vulnerable towards fluctuations in the global market/economy
	Environmental awareness puts pressure on agriculture

### 3.3.2.2. SWOT analysis of scenario S2 (“Nature matters”)

STRENGTHS	WEAKNESSES
Airports and harpers strategically placed in the region	Traffic congestion
Network and clusters of food industry and others is already in place	Rising cost in urban areas on the east coast
The larger industrial clusters makes it easier for SME to get established, to exploit the infrastructure and to support from their bigger sisters	Labour force needs to get better educated and problems getting labour in rural areas and on the west coast
Climate change will make it possible to grow new crops, Maize, Sunflower, Soybeans	Production is characterized by a high national cost level
Promotion of continued innovation, product development and new technology	Strong environmental regulation is a burden on especially primary production
The industries are highly adaptable in relation to new requirements and changed conditions	The region need to raise the level of education and put more well-educated people to work in – primarily tourist businesses that operate in rural areas
The industries are characterized by high production efficiency	
The countryside provides large areas needed to produce renewable energy (wind and biomass)	Wind turbines and biofuel production disfigure the countryside
Strong coordination between sustainable (environmental and landscape) primary food production with environmental, climate and energy policy	
The industries consider nature and the environment, and protect drinking water resources	
OPPORTUNITIES	THREATS
Exploitation of growing international market for animal products	High quality competitors from other parts of the world
Promotion of continued innovation, product development and new technology	Bigger farms and Intensive agricultural production will change the landscape
Continued promotion of environmentally and naturally sustainable production through specific development projects and regulation	Labor force too small

The emission of CO2 per capita is lower in the Central Denmark Region than in the rest of Denmark and several of the municipalities in the region have ambitious goals in minimizing the emission further, for example is the goal of the City of Aarhus to be CO2-neutral in 2030	
Coordinate a sustainable primary food production with environmental, energy and climate policy (Green Growth)	The developing of quality production will not always turn into higher income and more jobs value regarding income and job
Increase the contribution of agriculture to nature (biodiversity) and to the quality of life in the countryside	Need to invest heavily the infrastructure – both physical and digital – is equally important, as is good public transport
Short distance between research and knowledge centres agriculture and food production form a value chain that comprises one of the region's opportunities.	National and EU polycy is setting the economic frame if biomass production is economic or not
Strengthen cooperation between primary producers, food companies, consultancy, research and innovation. Key words: Differentiation, innovation and competence	Extensification in some areas can lead to of overgrowth (shrubs and woodland) of natural habitats and have a negative influence on biodiversity
Increased diversification of agricultural earning potential	Environmental awareness puts pressure on agriculture
Opportunities for recreation and the many holiday homes in the rural districts make tourism an important business in rural areas.	

### 3.3.2.3. SWOT analysis of scenario S3 (“Revitalization of the Central Denmark Region rural region”)

STRENGTHS	WEAKNESSES
Airports and harbours strategically placed in the region	Slow public transport for those who commute between cities over longer distances to work as well as education
The industries consider nature and the environment, and protect drinking water resources	More attractive jobs for well educated people must be created to get people to move into rural areas and even from the university city Aarhus to some of the other medium size cities in the region.
The emission of CO <sub>2</sub> per capita is lower in the Central Denmark Region than in the rest of Denmark and several of the municipalities in the region have ambitious goals in minimizing the emission further, for example is the goal of the City of Aarhus to be CO <sub>2</sub> -neutral in 2030.	The industries are facing a growing economic burden as a result of environmental regulation
Local networks and Clusters have been established for “Branding” – even out of the region – local quality products and experience economies.	The region need to raise the level of education and put more well-educated people to work in businesses that operate in rural areas
The countryside provides large areas needed to produce renewable energy (wind and biomass)	
Strong coordination between sustainable (social, environmental and landscape) primary food production with environmental, climate and energy policy	Wind turbines and biofuel production disfigure the countryside
OPPORTUNITIES	THREATS
Competence boost in the food industry sector. Attractive jobs for well educated people outside Aarhus	High proportion of biomass production (willow, Miscanthus and other crops) will have negative influence on nature and biodiversity in some areas
Strengthen the regional University’s regional engagement	Extensification in some areas can lead to of overgrowth (shrubs and woodland) of natural habitats and have a negative influence on biodiversity

Exploitation of growing market for quality products, Organic food and local brands	The dilemmas of successful organic farming e.g. subsidiarity, principle in conflict with export
Promotion of continued innovation and product development	Environmental awareness pressure on agriculture
Increased diversification of the industries' earning potential	Need to invest heavily in the infrastructure – both physical and digital – is equally important, as is good public transport between urban areas
Continued development of recreational assets and nature management	Environmental awareness puts pressure on agriculture
Continued promotion of environmentally and naturally sustainable production through specific development projects and regulation	
Less dependency on national and EU energy policy, due to local bioenergy supply	
Opportunities for recreation and the many holiday homes in the rural districts make tourism an important business in rural areas.	
Further develop local networks and Clusters for “Branding” – even out of the region – local quality products and experience economies	

### **3.3.3. Assessment of the performance of Central Denmark Region regional development scenarios in respect to the objectives set**

In this section, the overall assessment of the performance of each regional development scenario for CDR is presented, based on the SWOT analyses. First, the performance of each scenario in respect to the objectives set is discussed. Then a simple rating matrix was filled up, in order to have a rough initial assessment: scenario performance has been ranked, for each of the 6 objectives, from 1 (poor performance) to 5 (good performance), based on the previously presented SWOT tables. The matrix data has been presented also in a spider diagram and the final assessment has been done, as described below.

#### **3.3.3.1. Environmental protection**

If we look at the environmental excluding preservation of the landscape, biodiversity and GHG emission Scenario 2 is the most environmental friendly due to the concentration of industry in designated areas, where waste flow can be better controlled. Also intensive agriculture can prove to be quite environmental providing the right management and technologies are in place. Scenario 1 is less environmental friendly due to heavy farming, even though clean technologies are being used. Scenario 3 we have a combination of extensive and intensive agriculture, but new and environmental technology is not applied to the same degree as in Scenario 1 and 2. Furthermore small industry waste is more difficult to control, when the sources are more spread.

Both scenario 2 and 3 has focus on alternative energy sources, which from a perspective of reducing CO<sub>2</sub> is beneficial.

Scenario 2 and 3 is beneficial from the perspective of improving biodiversity, with a lead to scenario three due to a higher degree of extensive farming.

Ranking:

Scenario 1: 3 due to the poor performance on nature values and biodiversity

Scenario 2: 5 due to high performance in landscape and nature preservation and biodiversity and clean technologies

Scenario 3: 4 due to high performance in biodiversity and nature preservation

#### **3.3.3.2. Economic efficiency**

Scenario 1 is clearly the most economic efficient due to the economy to scale of the industry cluster, efficient infrastructure and intensive agriculture. Scenario 2 follows but is less efficient due to the concern for nature values (less freedom for agricultural production). Scenario 3 is the least efficient both due to the high proportion of



extensive agriculture and the more spread SME and longer transport.

Performance

Scenario 1: 5 due to efficient infrastructure, industrial clusters and infrastructure

Scenario 2: 4 due to efficient infrastructure, industrial clusters and infrastructure and diversified industry (tourism, energy), but less freedom for agriculture production.

Scenario 3: 3 due to spread industry and extensive agriculture

#### **3.3.3.3. Regional development**

Immediately scenario 3 appears as the scenario with the best regional development because of the revitalisation of rural areas. However, if scenario 1 and 2 generate more income it would be expected that there will be some spill over effect to the rural areas (when it rains on the vicar some drops fall on the parish clerk). Since scenario 2 is rather economic efficient and also considers tourism and renewable energy as economic motors, it could be argued that this scenario is best for regional development.

Performance:

Scenario 1: 4 due to high economic performance with spill over effect on rural areas

Scenario 2: 5 due to high economic performance with spill over effect on rural areas

Scenario 3: 4 due to better economic performance in rural areas and home market orientation

#### **3.3.3.4. Social cohesion**

Scenario 3 clearly perform the highest on social cohesion due to the vital rural regions and thus better equality throughout the region. Scenario 2 performs alright due to the good recreational possibilities. Scenario 3 performs the worst due to inequalities between east and west, and less recreational possibilities.

Performance

Scenario 1: 2 due to inequality

Scenario 2: 3 due to recreational possibilities

Scenario 3: 5 due to equality

#### **3.3.3.5. Food quality and safety**

All three scenarios has focus on food quality but in scenario 1 and 2 quality is referred to as high uniform and safe standards, while in scenario three quality comes from being unique, tasteful and an experience to consume.

Performance

Scenario 1: 5 due to homogeneous and high quality and safety

Scenario 2: 3 due to homogeneous and high quality and safety

Scenario 3: 5 due to unique and high quality and safety

### 3.3.3.6. Energy

Scenario 2 is probably the most energy efficient due to focus on renewable energy and efficient production. Scenario 2 is economic efficient but relies on traditional energy sources. Scenario 3 is both economic efficient and relies on decentralised energy resources.

Performance:

Scenario 1: 2 due to dependence on traditional energy sources although energy efficient

Scenario 2: 4 due to energy efficiency and renewable energy

Scenario 3: 3 due to focus on renewable local energy sources that is less efficient than centralized (smaller wind turbines and bioenergy plants)

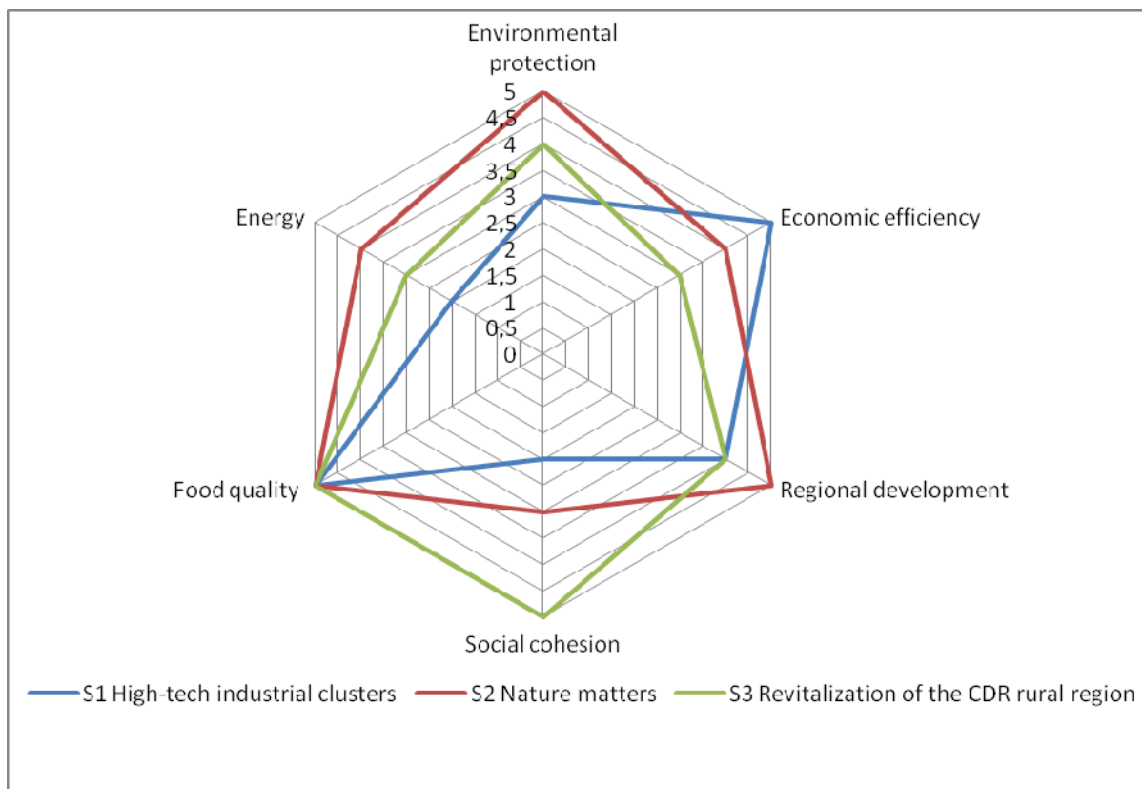
### 3.3.4. Prioritizing Central Denmark Region regional development scenarios

**Table 7** – Performance assessment matrix for the three regional development scenarios for Central Denmark Region (ranked from 1: poor, to 5: good performance level)

	Environmental protection	Economic efficiency	Regional development	Social cohesion	Food quality	Energy	Total
<b>S1</b>	3	5	4	2	5	2	<b>21</b>
<b>S2</b>	5	4	5	3	5	4	<b>26</b>
<b>S3</b>	4	3	4	5	5	3	<b>24</b>

The matrix data (Table 7) is also presented in a spider diagram (Figure 1313). Both the table and the spider diagram are supporting the following prioritization of the Central Denmark Region regional development scenarios:

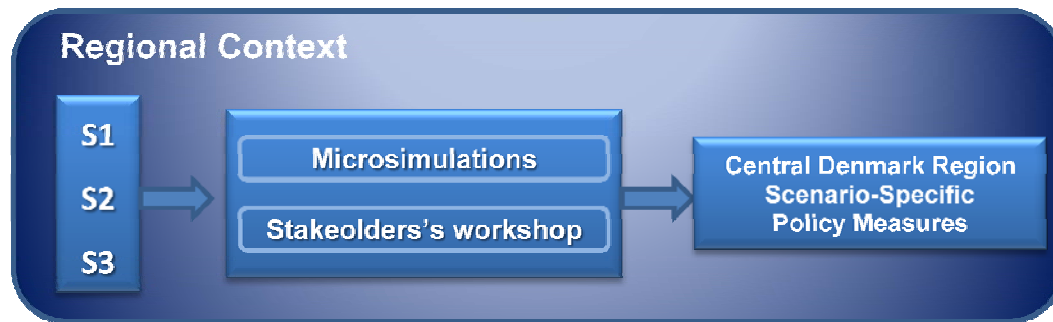
- 1<sup>st</sup> priority: S2 – “Nature matters” scenario
- 2<sup>nd</sup> priority: S3 – “Revitalization of Central Denmark Region rural region” scenario
- 3<sup>rd</sup> priority: S1 – “High-tech Central Denmark Region” scenario



**Figure 13:** Performances of the three regional development scenarios

## 4. Part IV – Validation of Central Denmark Region Regional Development Scenarios (D6.3)

Based on the methodological approach presented in Part I of this report (18), regional development scenarios developed for each AG2020 case study are validated by local stakeholders. In this part, which corresponds to D6.3 deliverable for the Central Denmark Region AG2020 case study, the validation of the regional development scenarios, carried out with the support of local stakeholders, is presented. This goal has been fulfilled with the support of the following tools: a) the Microsimulation tool and b) the stakeholder workshop (see Figure 14 below). In the following, section 4.1 presents the application and results of the Microsimulation tool, while section 4.2 presents the stakeholders' workshop.



**Figure 14:** Validation of scenarios: methodological approach and tools used

### ***4.1. The application of Microsimulations tool***

In WP6, Microsimulations (MSM) were run by FEBA team for CS1, CS3 and CS4. The Microsimulations performed aimed at revealing the likeliness that farmers in the respective case study regions are willing to adopt the changes that are necessary for the three Regional Development Scenarios.

Microsimulation is a technique that aims at modelling the likely behaviour of individuals, who represent members of a population, for the purpose of studying how individual (i.e. micro) behaviour generate aggregate (i.e. macro) regularities from the bottom up (e.g., Epstein, 1999). It reweights the interviewed persons sample to fit the regional total statistics. Of course, this reweighting procedure needs good and reliable regional data.

For this analysis, a sample of 68 farmers has been used, for which it is explored their

willingness to change towards specific directions that are related to the three Regional Development Scenarios for Central Denmark Region. Since questionnaires were given by phone, it was not possible to detail the 3 scenarios to interviewed farmers. Therefore they were asked about their willingness to develop into 3 different ways:

- a) use new technologies;
- b) produce high quality products for the local market; or
- c) develop other (additional) activities on the farm.

Personal and farm data and details were asked as well.

#### 4.1.1. Microsimulation summary results

In Central Denmark Region, 32 farms (out of 68 in the total analysis) were included in the analysis. For the Danish case, the farm and personal characteristics were collected from the Advisory Service Database in Central Denmark Region, and the (several) advisors were interviewed about each farmers' behaviour and willingness to change. They were asked about farmer's willingness to develop following three different paths:

- a) use new technologies (NT);
- b) produce high quality products for the local market (HQ); or
- c) develop other (additional) activities on the farm (AA). Personal and farm data and details were asked as well.

Table 8 shows the average values of several farms in Bulgaria, Denmark (Central Denmark Region) and Italy (Tuscany). In our sample, the largest farms are found in Denmark (mean 84 ha), the smallest in Bulgaria (mean 28 ha). However, those larger farms in Denmark with on average a higher level of technology have less often a successor, only 35% of them. In Tuscany, most of the questioned farms are organic and they often gave a larger number of persons employed. The share of expenditures and sales on the local market (within 50 km) seems to be quite similar in Denmark and Tuscany, but relatively low in Bulgaria.

**Table 8** – Characteristics of the questioned famers and their farms

	Sample	Size	Successor	Organic	Employees	Level of technology	Local Expenditures	Local Sales
	#	ha	0/1	0/1	#	1-5	%	%
<b>Bulgaria</b>	10	28	0.60	0.0	0.7	3	45	37
<b>Denmark</b>	32	84	0.35	0.10	2	4	71	60
<b>Tuscany</b>	26	57	0.65	0.70	4	3	74	61

The preferences expressed by the farmers regarding the 3 possible futures (as shown in Table 9) show that: (i) the Danish gave lower scores in general, and their most preferred is NT; the least preferred is AA; (ii) in Bulgaria AA is the least preferred, and NT is the most desirable; (iii) in Italy, the farmers resulted interested in all 3 proposed paths.

**Table 9** – Willingness to develop following the 3 paths (on a scale of 1-5)

	<b>NT</b>	<b>HQ</b>	<b>AA</b>
<b>Bulgaria</b>	4.3	3.1	1.9
<b>Denmark</b>	2.6	2.0	1.8
<b>Tuscany</b>	4.4	4.4	4.3

NT: new technologies

HQ: high quality products

AA: other (additional) activities on the farm

Apart from their preferences for the 3 possible future developments, the farmers were also asked to choose the most preferable one (Table 10). In Bulgaria and Denmark, most farmers choose NT, while in Tuscany HQ is considered to be the most preferable. Interestingly, while the 20% of both Bulgarian and Tuscan farmers liked all the 3, in Denmark the 20% liked none of them.

**Table 10** – Most preferred development path (on a scale of 0-1)

	<b>NT</b>	<b>HQ</b>	<b>AA</b>	<b>All</b>	<b>None</b>
<b>Bulgaria</b>	0.5	0.2	0.1	0.2	0
<b>Denmark</b>	0.7	0	0.1	0	0.2
<b>Tuscany</b>	0.1	0.6	0.2	0.2	0

NT: new technologies

HQ: high quality products

AA: other (additional) activities on the farm

In order to understand the preferences of the farmers for the 3 different future developments, choices were afterwards related to a set of household characteristics, namely: age of the farmer (continuous variable), education level of the farmer (4 classes), the number of household members, and whether there is a successor or not (dummy variable: yes/no). Farm characteristics were investigated as well: being organic (dummy variable), size (ha), number of employees, level of technology (ranked 1-5), and share of income from agricultural activities (%).

Analysis suggested that the willingness is better explained by the household

characteristics than by farm characteristics. An important variable is age: younger farmers are more likely to adapt to new technologies. Furthermore, having a successor is also important. Finally, farmers that are (already) receiving most of their income from agricultural activities are more likely to work with new technologies.

Regarding HQ (high quality products), it seems that in particular farmers with no successor, a relatively large number of household members and of a low educational level is interested in producing high quality products for the local market. Furthermore, these farmers are more likely either from Bulgaria or Italy. However, when looking at the total, only the level of education is significant. Furthermore it seems that organic farmers with a higher level of technology, that often already produce high quality goods, are more willing to develop into this direction.

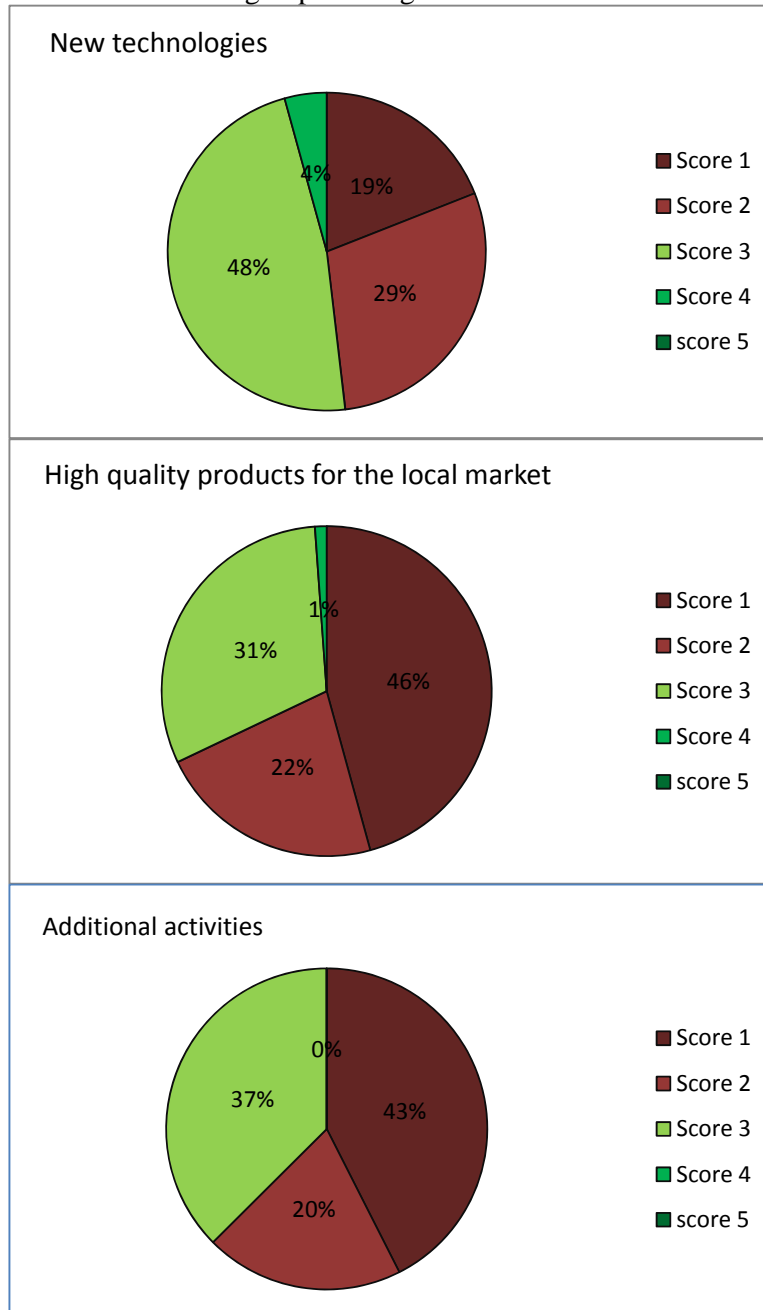
The willingness regarding AA (other additional activities on the farm) cannot be explained by the household characteristics. The results improve when the farm characteristics are taken into account. It appears that the level of technology and the share of agricultural income are related to the willingness to develop other non-agricultural activities: farms with lower level of technology and with additional sources of income are more likely to become or stay multifunctional in the future. In addition, these farms are less likely located in Denmark.

#### **4.1.2. Willingness of the CDR farmers to change**

Although the farmers were asked to rate their willingness to adapt one of the 3 futures on a scale of 1-5, none used a value of 5. However, as in many northern European countries, it seems to be part of the Danish culture not to use the highest scores when valuing something. Furthermore, some farmers indicated that they are not in favour of any of the suggested futures. A relatively large group of farmers (appr. 30 %) in the region is on the way out of the agricultural business – and they are not willing to make changes or invest in new technologies.

Figure 19 shows the simulated willingness of all farmers in Midtjylland to develop into the 3 futures proposed. When looking at the low scores, it appears that only 19% of the farmers really dislike future 1, incorporating new technologies. For future 2 and 3 this is more than 40%. In addition, 29% rates future 1 with a score of 2, for the other futures the share of farmers rating it with a 2 is a little lower, around 20%. When looking at the share of farmers giving more positive rates, 48% rates future 1 with a score of 3 and 4% even with a score of 4. This is much higher than the scores

for the other two futures. When the results of the microsimulation was presented at a stakeholder meeting in Denmark it was concluded, that Danish farmers generally are very much willing to change and invest if markets are proved ready. The region is very strong in quality food production and bioenergy and some farmers are adapting into new directions. On the other hand this group of fore (front) runners is often very visible but not so big in percentage of all farmers.

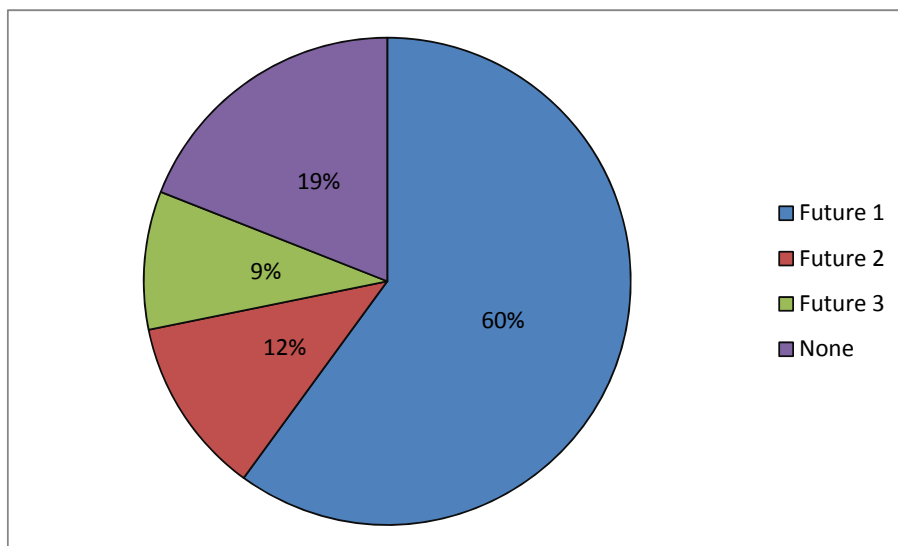


**Figure 15:** Willingness of Central Denmark Region farmers to adapt to the three proposed development paths (1 – no interest, 5 highly interested)



#### 4.1.3. The Choice of the farmers

According to Figure 15, the Danish farmers show a clear preference for future 1, using new technologies; 60 per cent of them choose this future. Only 9 and 12 per cent favours future 2 and 3 (Figure 16)



**Figure 16:** The most preferred future for Danish farmers

From these results, the Danish farmers are considered to develop better within paths 2 and 3, namely “produce high quality products for the local market” (HQ) and “develop other (additional) activities on the farm” (AA), which corresponds to Scenarios S2 and S3, respectively. This result confirms the main conclusions of the workshop.

#### 4.1.4. Characteristics of the farmers

Table 11 shows some additional information about the groups of farmers in Denmark according to their most preferred future. We did not include the farmers that favour future 2 because they are related to only 1 farmer of the micro population.

First of all, it appears that the level of technology is more or less the same for the 3 groups of farmers. Furthermore, it seems that the share of expenditures in the local areas (within 50km) is rather similar for all farmers; however, the share of local sales does differ. Interestingly, the farmers that want to integrate new technologies have on average relatively large local sales; in addition, half of them have a successor.

When looking at the different income sources, it is interesting to see that the farmers not interested in any of the proposed futures receive most income from agricultural activities. However, they also do not have a successor. This is an important insight,

because it means that if the EU wants to change agricultural activities in this region into a certain direction, the farmers that now produce a large share of the agricultural production, are less willing to change in the near future and will probably finish their business in the longer future.

However, there is also a group of farmer with no successor that are interested in starting new activities on their farm. These are mostly farmers that already receive a large part of their income from an off-farm job and from subsidies or pensions.

**Table11:** Characteristics of the simulated Danish farmers according to their most preferred future.

	Local expenditures	Local Sales	Level of technology	Suc-cesor %	Income from (%)			
	%	%	1-5		Agricultural activities	Other on-farm activities	Job off the farm	Subsidies and Pensions
Future 1	83.5	81.1	3.3	50	37.6	0.4	62.0	0.0
Future 3	80.0	51.9	3.3	0	12.7	0.0	71.3	16.0
None	80.0	76.9	3.4	0	82.6	0.0	16.1	1.3

#### 4.1.5. Conclusions

From this analysis we try to understand which kind of farmers are more willing to develop in a certain future direction than others. We are in particular interested in future directions that are related to the Images of the Future, developed in WP5.

Therefore, farmers in three case-study regions in Bulgaria, Denmark and Italy, were asked about their preferences for 3 future directions: 1) use new technologies; 2) produce high quality products for the local market; or 3) develop other (additional) activities on the farm. We also asked them about their personal characteristics, as well as about the characteristics of the farm.

Firstly, we defined types of farmers in all three countries by using ordered logit analysis and factor analysis. There appeared to be 4 types of farmers:

1. Farmers interested in future direction 1: using new technologies. These are in general non- organic farmers with a higher education and from Denmark. Furthermore the farms have higher levels of technology and obtain a large share of the income from agricultural activities. These kinds of farmers generally dislike future 2.
2. Those farmers that favour future direction 2: producing high quality products for the local market. These farmers often have a successor, and larger families. In addition, the farms are large in size with a relatively large number of employees and a higher level of technology.

3. Farmers that dislike future direction 1, using new technologies. These are generally older farmers, with a higher education and larger families. They produce often organically and they can be from Denmark. They don't seem to favour any of the futures proposed.
4. Farmers that favour future direction 3: starting other activities on their farm such as tourism. They often already have other sources of income next to their agricultural activities and they have a successor to take over the farm.

This information is an important input to the microsimulation as it helps selecting which variables should be selected as constraint variables. The constraints selected for the Danish case-study are: 1) age of the farmer, 2) size of the farm, 3) type of farm; and 4) organic production. For the Italian case-study we used: 1) age of the farmer; 2) education level of the farmer; 3) type of the farm; and 5) organic production.

For the Bulgarian study not enough information was available to run a simulation. However, the results of the questionnaires indicate that most farmers prefer to develop and use new technologies to increase their level of production. This means that Image 1 would receive most cooperation. However, because of the relatively low level of technology and the smaller farms Image 2 and 3 could be suitable as well.

The results of the simulations are very interesting. First of all it became clear that in general farmers from Tuscany are more willing to change, or to think about new futures. As much as 12 per cent of those farmers are interested in all 3 futures, while 19 per cent of the farmers from Central Denmark Region did not like any of the three. It appears that both these farmers in Denmark and in Italy have no successor; however, their attitude is completely different. This is important to keep in mind when developing local policy packages.

In Central Denmark Region, most farmers (60 per cent) are interested in adapting new technologies. This is not a surprising result. However, what might be interesting is that currently, more than half of the income of those farmers is obtained from an off-farm job. Possibly, these farms need some adjustments in order to obtain a larger share of the household income. The farms that do obtain most income from agricultural activities in Denmark are also the ones not interested in any of the futures. However, from this we can conclude that Image I would fit the Danish farmers best.




In Tuscany, the farmers are in general more interested in all three futures. The ones interested in adapting new technologies already have quite high levels of technology. Also the ones interested in producing high quality products for the local market in general have high level of technologies and they already share most of their products locally. This means that it is likely that the farmers in Tuscany are willing and able to

reach all 3 Images of the future.

However, the almost 50 per cent of the farmers that are in particular interested in developing additional activities in the farms don't receive much income from other on-farm activities at the moment. This means that if, for example, for Image III it is necessary to promote multifunctionality, additional measures and policies are needed.

## 4.2. Interviews

In May 2009 BGI visited AU and a series of interviews were conducted in the middle and Eastern part of the Region. The different farms visited represents different farm types as found in the structure of farm types in Denmark. Below is given a short summary of the interviews from each of the farms.

Photo from Farm	Description
	<p><b>Organic plant production - 'CONVERSION OF FARMING INTO NATURE PRESERVATION ACTIVITY'</b></p> <p>One manager is taking care of about 3 state owned organic farms with no other employees. All the machinery is rented. There are some seasonally employed workers. Part of the land is a natural park, including a lake. The farm has rented part of its buildings for the only of its kind in the region 'kindergarten in the nature'. Children are playing in the nature, in the forest, all the year long. There are more applicants to join it in comparison with available places. Future is seen as slowly decreasing the cultivated land getting more subsidies to maintain the nature. There is no intension by the manager for developing agritourism activities, but organic farming is popularized among public through organizing several open days during the year.</p>
	<p><b>Conventional part time farming - 'ROMANTIC VIEW OF FARMING'</b></p> <p>It is a young family with 3 girls - scouts. There are difficulties for children to participate in social activities because of the remoteness of the farm from the town and lack of public transport in the area. Both parents are taking part time jobs in the nearby town. When they started, the father was a full time farmer and the mother was taking care of the kids, but the income was too low as to make a living. Now they have about 30% income from agriculture and around 70% income from their part time jobs. There are difficulties to find a market for their apples as their quality cannot compete with organic apples nor their price can compete with imported apples from abroad. Farming is a family tradition for this couple and they enjoy very much the countryside way of living. Their future vision is to stay the same. They are happy with this kind of living.</p>
	<p><b>Conventional pig production - 'FARM IS A FACTORY'</b></p> <p>Young lawyer's family with 3 kids. They were looking for a type of farming activity with a good income. They are producing up to 150 000 piglets per year. Hundred percentage of animals are exported to Germany, because of the good price. Denmark is having a good image abroad in pig farming, it's a traditional pig producer, it has good a genetics of animals and keeps strictly the quality and safety measures. Because of legislative restrictions put on farmers by Danish Government, like number of animal units per farmer and environmental restrictions, the owner is expanding his business abroad. He built a new farm in Slovakia, that is even more profitable than the one in Denmark. Agricultural investment purposes are used for this purpose. He plans to expand his business by setting new farms in new countries in Europe. He has a biogas facility at one of the farms, but still it is not enough profitable to run. He implemented a few innovations at his farms as to limit the environmental effect of his activities, like adding special substances in the feed for liming the content of nitrogen and outdoor smell of manure.</p>



### **Conventional plant production - FARMING AS A WAY TO HAVE A RELAX TYPE OF LIFE AND TIME TO INNOVATE**

Holder of the farm is a former owner of successfully developed and run factory in wood sector with 2700 employees. Because of his age he decided to sell the factory on the stock market on a very good price and buy estate in the countryside and to have farming activities as a hobby. He has grass seed and oilseed rape plantings. Within his land there is an area protected by Nature 2000. Additionally he is keeping a company, producing the equipment for spraying the manure on the fields. Having an innovative and future oriented thinking he realized that it is not going to be allowed any spreading of the manure in the future in the way it is done nowadays. Therefore he bought and merged 3 companies as to develop a new biogas technology that is already patented. Still there are some legislative restrictions that hinder the marketing of technology.



### **Organic cattle farming - WE STARTED THE FARM ORGANIC BEFORE IT GOT MODERN**

They started to run the farm organic in 1992 and are organic for 17 years now. At the start they have to keep around the corners to show what they were. Today it is quite positive that you are organic for the rest of the people. The owner thinks that today traditional farming is nearly as good as organic farming. But going 20 years back quite a few things have not being done ok. Today they run 350 hectares and have 180 - 200 cows and they are a company working together with traditional farmers. The price of organic milk is going down because of the financial crisis and the tendency among the consumers is to spend less on food. He will continue his farming activities at the same scale as in the past. Have some considerations about the extension of nearby village that can put some restrictions on his farm. Newcomers in the village do not tolerate the smell and the noise coming from the farms in comparison with the local inhabitants.



### **Conventional Cattle farming - I LOVE CARING FOR COWS**

It is a medium size farm. The owner is continuing the activities of his parents. He feels comfortable with the cow breeding. Also he enjoys the continued through year caring for animals like cows. His wife has a full time job in the town. In the past she was providing a substantial part of the family income, around 50%. Nowadays farming becomes much more profitable for them, because of the continued reinvestment in new cows that are currently reaching 180. There are some restrictions on Danish farmers to grow in a bigger scale, but the number of his cows is quite far from the allowed maximum. He expects some difficulties in the future, because the surrounding land is recently bought by a water company and this can put some restrictions on the amount of manure he spreads around, respectively on the number of cows he breeds. A few farms in the region are planning to gather the manure and to settle a cooperative biogas facility, but it is difficult to position the plant on the right place as to be close to all farms and as to have no complaints from nearby living people.

### **MAKE LIVING AND STILL STAY IN THE COUNTRYSIDE**



A farm with 300 cows, breed for beef meat. They live in exceptionally good environment on the open. The owner has a special carrying attitude toward the animals. He wouldn't go for any other type of animal breeding that is not carrying well for the animals. He even keeps a few dears in his garden. He is selling his beef to Danish Crown - the biggest Danish meat company that is selling products of a higher value and at a higher price. Still the price of his beef is too low as to justify the breeding of cows for 2,5 years. The farmer is limiting the number of years each year with the intension to continue this activity at a very small scale as a hobby. 4 years ago he started a new business - building fences for other farms, that provides him the opportunity to stay on the open and continue his living in the countryside.

### ***4.3. Stakeholders workshop***

Descriptive information regarding the Central Denmark Region has been collected by during the first years of AG2020 project from several different available sources, such as national and regional statistical service, regional administration, scientific literature, regional research institutes, websites, key informants, etc. This information is available in Part II of the present document.

A stakeholders' workshop was held in Foulum the 10<sup>th</sup> of November 2009. Invited stakeholders were provided with background material, to be studied before the workshop, consisting of the main findings of the Tuscany Case Study, and introductory documents regarding the AG2020 project.

Participants:

- Klaus Drivsholm is economics counselor at LandboMidtØst
- Niels Halberg, Head of ICROFS
- Bjarne Mousten, farmer with dairy herd of 125 cows and 110 ha
- Tom Vestergaard. Unit, Cattle at LandboMidtØst
- Torkil Stensig, Central Region - Vækstforum, energy and environment
- Vestergaard, part-time farmer with cattle (limousine), a focus on breeding and fattening cattle
- Lars H. Jensen, Central Region - Vækstforum, food
- Jørgen E. Olesen, Faculty of Agricultural Sciences, AU, professor specializing in agriculture and climate
- Jens G. Hansen, Faculty of Agricultural Sciences, University of Aarhus, Research Scientist, working through regional analysis of AG2020 and indicators
- Kristian Borch, DTU, coordinator of the project

### ***4.4. Central Denmark Region - analysis in context of AG2020***

*Kristian* briefed on the project has brought forward three future images of agriculture. Our challenges include: To look at what tools can take us forward to each of these images. In four areas in Europe - Bulgaria, Greece (Crete), Italy (Tuscany) and Denmark (Central Region), we will collect information about challenges and need for political instruments that are related to the three images, but are rooted in local and regional issues.

The three images of the future are:

- *Image 1: High-tech, European-managed and sustainable agriculture - top-down from the EU.*
- *Image 2: Balanced, sustainable agriculture - focus on sustainable production, where both the EU and grassroots organizations have influence.*
- *Image 3: Active regions and reflective lifestyle - critical about the central administration. Grassroots organizations have a major influence.*

*Jens* gave a review of the project's preliminary findings from the Central Denmark Region: The presentation ended with a table of strengths and opportunities / challenges and barriers

Strengths and opportunities	Challenges and barriers
Main Industry: Food / energy / textiles / furniture	Coordinate a sustainable primary food production with environmental, energy and climate policy (Green Growth)
Large Agricultural and food production (11,500 food-related businesses in region)	Strengthen cooperation between primary producers, food companies, consultancy, research and innovation – Key words: Differentiation, Innovation and Competence
Global food industries and strong knowledge environments (123 billion, 23% of turnover)	
Strong economic clusters of Food companies	Further develop local networks / clusters to "Branding" - even out of the region - local quality products and experience economies.
High investment rates in the food industry	
Focus on Ecology: ICROFS, Thise Mejeri, Friland, Tange Frilandsgartneri, Urtekram, Woodshade (examples of successful organic companies)	Get the the large multinational companies to help small innovative companies
Society focus on obesity, health and ethics / ecology and quality	Coop with unstable markets: Climate issue, rising energy prices, financial crisis, etc.
Increasing global demand for high quality products	Competence boost in the food industry sector: Coherent and attractive education Attractive jobs for well educated employees
EU Rural development funding: "MegaTargets" on 1) agriculture and food and 2) energy and biomass	Strengthen the regional University's regional engagement
The Government's Green Growth Strategy gives	The dilemmas of successful organic farming e.g. subsidiarity principle in conflict with export
	The Government's Green Growth Strategy puts environmental pressure on agriculture
	Developing quality production granted great value regarding income and jobs?

## Discussion

*Torkil* commented on our strengths in the region, including the textiles sector. Today we have almost as many employees, but today is not production they are engaged in, but more about quality and distribution. The same is likely to happen for the furniture industry, and it is probably coming within the energy and environment sector too. We should probably focus more on knowledge-based jobs in the future.



**Lars** thought that the food industry's traditional jobs will disappear. In this sector we are now where the textile industry was 20 years ago.

**Jørgen** believed that the Danish food industry had been too successful - some companies have almost monopoly on the market.

**Bjarne** stressed that when the world population grows, so must the need for food.

**Jørgen** thought that the problem was earnings.

**Klaus** argued that Denmark's strength is that we have significant expertise in producing food, also found that was too much focus on the ecology and organic agriculture in the Image 3 – Food produced “non-organic” can also be of very high quality.

**Klaus** also proposed that local producers could sell their products in town squares and in dedicated areas in the big supermarkets to present and sell their products.

**Niels** found that there was not necessarily a link between local production and ecology. Consumers will have any Danish products. Did not find that "Farmers Market" will be really big in Denmark, we should probably focus more on professional intermediary chains. Supermarkets will now also be able to take season-related and small entities in their range.

**Kurt** found that the part-time farmers are very different, and each found their niche. Thought that they would be vulnerable in local markets, but in small groups, such as Friland will be more secure.

**Torkil** found that it is important to discuss how many we in Denmark (EU) should feed (outside Europe) and how do we in the EU use the land we have.

**Jørgen** said that the EU has a large export of animal products, and found that the discussion was interesting and that same discussion also takes place in the government's climate panel.

**Jørgen** inquired into how much Denmark has to produce of food and energy.

**Klaus** suggested to grow maize on poor soil and use this to biomass.

**Jørgen** thought it would be socially problematic, because the poor soil could easily be used for food production.

**Niels** felt that a backlash to the environmental concerns could be to increase production in EU in order to solve the world food supply, but this would not help developing countries, as it would destroy their local market.

**Niels** asked what kind of development we want in Europe. We should support an agricultural development which does not destroy our soils.

**Jørgen** agreed with Niels that people in developing countries are not starving for lack of food but because of poverty.

**Tom** wanted to see the microsimulation results made up of full-and part-time farmers. Also did not find that the willingness to shift from conventional to organic agriculture is as high as it was 10 years ago. Producers do not believe in consumers

anymore. There were many who suffered a lot at that time - and it is not forgotten so easily.

**Klaus** said that many part-time farmers had no natural generational persons in the family.

**Jørgen** asked if the willingness to change is associated with financing options?

**Torkil** meant that producers were willing to change but the market was not ready yet.

**Klaus** claimed that the banks had a shock, and all have learned from the financial crisis, and the future will therefore be more focused on earnings, before one can borrow money in the bank.

**Kristian** had been to a meeting at which an economist at Nordea Bank had expressed that the continuing agricultural subsidies will help the agro-economic situation.

**Kurt** felt that since there were many small part-time farmers with different priorities, willingness to change was probably not so great.

**Kristian** would like to hear some views about the challenge in the 3rd Image

**Torkil** believed that the appreciation of such nature conservation, such as subsidies for environmentally sensitive land should be given for concrete actions.

**Jørgen** found that there were two players on this, namely whether consumers will pay more for products and how EU support is implemented. Suggested a direct support to contracts with farmers for a behavioural conduct.

**Bjarne** told that it was a bulk production to market conditions he sold, and that he had no plans for such a farm shop or similar. He had sold the land on his farm, which was environmentally sensitive and uninteresting for his production - the focus is mostly on an "industrial agriculture". Also found that land that cannot be cultivated or planted should be turned into nature. Stressed that some of the areas that have been planted with wood etc. in recent years was really good agricultural land.

**Torkil** believed that in North River the cooperative idea should be reconsidered, but there is no economic incentive to participate in the project, which removes biomass, so nitrogen supply to water decreases.

**Jens** asked into what lies in the Green Growth package around combining agriculture / environment / support etc.

**Jørgen** said that in Germany there is support for biogas plants, therefore, there are so many down there. Also proposed a reorientation of aid from direct support to environmental support.

**Niels** felt that if you want an Image 3, so it requires quite a lot top-down management.

**Kristian** said that those who govern in Image 3 could be the consumer and grassroots organizations.

**Torkil** supported Jørgen that support of environmental good behaviour was a good idea.

**Lars** thought that it was the question whether we should start in some very different economies. We are probably more to the experience economy, where lifestyles are the driving force.

**Kurt** felt that part-time farmer's first paragraph is "the good life" for the individual. The EU does not necessarily support this.

**Jørgen** asked how to assess further expansion in this area.

**Kurt** said it is now difficult to see how there can be newcomers because of land prices.

**Jens** said that he had heard a success story of small businesses can get up to DKK 100,000 to establish contact with institutions within its territory - to generate innovation.

**Kurt** cited the example of the Friland, which has been bought by Danish Crown and thus have been able to double its turnover through a larger distribution system and experience. "The big help the small ones"

**Lars** also had an example about unpasteurised cheeses, where large and small companies are joining forces and doing research.

#### **Regarding Image 2:**

**Kristian** asked how we can create value by pro-environmental actions?

**Torkil** believed that incentives may be that there is a reasonable price on e.g. biomass, which makes it sustainable. As it is today, it is not so.

**Niels** felt that the reason for large proportion of organic agriculture in Denmark was financial support. Asked whether we can learn something from what has happened in the organic food area and transfer it to green energy. It is important that there is a transparency and the belief that it has an effect which means that consumers will pay more.

**Jørgen** thought that if we consider the past 2020, so has the energy to the cars the big challenge - and it's probably mostly questions about liquid fuels.

**Torkil** agreed that it is important to be able to analyse whole production chains.

**Jørgen** There has to be growth in industries, which thinks in these areas.

**Kristian** meant that for the technology not quite there yet, need some subsidy schemes. Fields for energy crops must be on the right soils.

**Torkil** found that it was important to subsidies good environmental behaviour.

**Jørgen** felt that we need support to come from research and innovation phase to actual production.

**Bjarne** said we should consider it to be a very long process, getting rid of farm subsidies too quickly it will go very wrong for Danish agriculture.

**Kristian** said that the EU Commission says that "flat-rate support is problematic, they find that aid should be shifted to contracts, the Commission has the willingness to

change, but the member wants the present system continues.

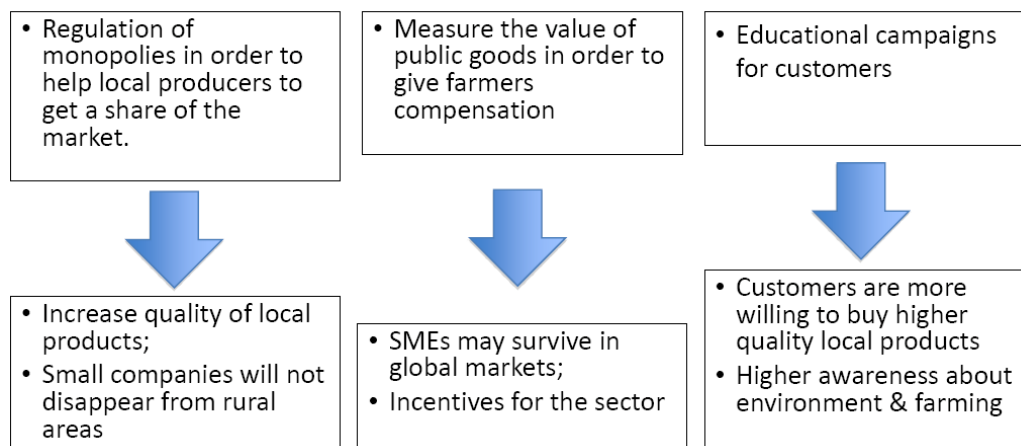
**Klaus** asked if there are estimates of what the change of the CAP, which we believe will come will bring. Will it become a way how instruments can be introduced?

**Kristian** rounded off and told about the subsequent process of summing up of today's meeting and how it will be presented the commission via AG2020 reports. Hoped that it would henceforth be able to see some of the things we've talked about appears in the new rules.

#### 4.4.1. Workshop synthetic results

The following scheme (Figure 21) shows the key results of the stakeholders workshop held in Central Denmark Region the 10th of November 2009 for AG2020 project, WP6.

In the upper boxes are shown the main policy measures needed to achieve the results shown in the lower boxes.



**Figure 21: Main results of the workshop held in Central Region Denmark**

#### 4.4.2. Workshop Conclusions

In the microsimulation study for Central Denmark Region, Image I was considered as the most preferable. None of the farmers were ranked 5 about willingness to change. For the region it is expected that approximately 700 out of 2000 conventional farmers will survive the next 10 years. This means that a majority of farmers – on the way to retirement – are not willing to change. On the other hand, it was stressed at the workshop that farmers supposed to remain are willing to change and adapt to new regional, National and EU policies.

## 5. Part V – Region- and Scenarios-specific Policy measures (D6.4)

In this part, which corresponds to D6.4 Deliverable for the Central Denmark Region AG2020 case study, a systematic overview of Central Denmark Region-specific policy measures, as emerged from this exercise, are presented.

### *5.1.Synthetic table of region-specific policies*

In this section, the main regional policy measures for each regional development scenario are listed, classified according to the type of policy (following the AG2020 template used in WP5).

#### 5.1.1. Structural Policies

<b>S1 (High tech Central Denmark Region)</b>	<b>S2 (Nature matters)</b>	<b>S3 (Revitalization of the Central Denmark rural region)</b>
Further development of logistics, infrastructure and ICT to support the establishment of innovative companies in the whole region	Further develop local networks / clusters to "Branding" - even out of the region - local quality products and experience economies.	Support small companies producing high quality, local products via cluster- and network initiatives
Encourage immigration and skilled manpower and the mobility of knowledge	Reorientation of subsidies from direct support to environmental support.	Investment in rural infrastructures

#### 5.1.2. Market Policies

<b>S1 (High tech Central Denmark Region)</b>	<b>S2 (Nature matters)</b>	<b>S3 (Revitalization of the Central Denmark rural region)</b>
Attract foreign investments in all sectors, especially in the energy sector.	Get the the large multinational companies to help small innovative companies	Investment and Support of local experience economies
Coop with unstable markets: Climate issue, rising energy prices, financial crisis, etc.	Support and promote very high quality food produced "non-organic"	Policies of shortening the chain of production
Removal of barriers and constraints for movement of goods, so to promote		

competition, innovation and specialization in all sectors		
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### 5.1.3. Agricultural Policies

<b>S1 (High tech Central Denmark Region)</b>	<b>S2 (Nature matters)</b>	<b>S3 (Revitalization of the Central Denmark rural region)</b>
Support large and efficient farms, that also have the financial power to invest in technology to minimise environmental negative impact, smell etc.	Strengthen cooperation between primary producers, food companies, consultancy, research and innovation – Key words: Differentiation, Innovation and Competence	The dilemmas of successful organic farming e.g. subsidiarity principle in conflict with export. Support local production of high quality products for local markets
	Coordinate a sustainable primary food production with environmental, energy and climate policy e.g. improve soil fertility, mitigate GHG emissions and increase yield and quality at the same time	Policies for shortening of the chain: create direct link between consumer and producer. WEB, Twitter, facebook and SMS tools
Policies that support collaboration between knowledge institutions (e.g. Aarhus University) and food companies	Support the implementation of new protein crops to minimize import of soya etc.	Protection of local and typical products
Support of innovation and business clusters in the region	Improve the education of the farmers to be able to obtain profitability, understand markets and at the same time take care of the environment	Labelling and certification of local high quality products
	Support for labelling and traceability of products; origin and type of production should be emphasized and defended on all markets	

### 5.1.4. Environmental Policies

<b>S1 (High tech Central Denmark Region)</b>	<b>S2 (Nature matters)</b>	<b>S3 (Revitalization of the Central Denmark rural region)</b>
Growth forum support development and demonstration of	Support sustainable farming that combines local production and use of	Support climate friendly agriculture in rural areas

technologies for sustainable energy crops, animal manure, residue and algae	bioenergy, food production and environmental protection	
	Subsidies for environmentally sensitive land should be given for concrete actions	

#### 5.1.5. Research, education, innovation and transfer of knowledge

<b>S1 (High tech Central Denmark Region)</b>	<b>S2 (Nature matters)</b>	<b>S3 (Revitalization of the Central Denmark rural region)</b>
Competence boost in the food industry sector: Coherent and attractive education and attractive jobs for well educated employees in the whole region	Strengthen the regional University's regional engagement	Educate the customers about local production and quality of food
Adapt education to a shift to knowledge based business (globalisation)		
Investment and focus on innovation advice concepts in the value chain of food production		

#### 5.1.6. ICT Policies

<b>S1 (High tech Central Denmark Region)</b>	<b>S2 (Nature matters)</b>	<b>S3 (Revitalization of the Central Denmark rural region)</b>
		Enhancement of the adoption and use of ICTs by farms and other businesses – access to information on green production, environmental friendly agricultural practises etc.

### 5.1.7. Regional Policies

<b>S1</b> <b>(High tech Central</b> <b>Denmark Region)</b>	<b>S2</b> <b>(Nature matters)</b>	<b>S3</b> <b>(Revitalization of the</b> <b>Central Denmark rural</b> <b>region)</b>
		Branding of local culture, lifestyle and experience economies
		Easy access from rural areas to the fewer and bigger hospitals in the bigger cities

### 5.1.8. Transport/Logistic Policies

<b>S1</b> <b>(High tech Central</b> <b>Denmark Region)</b>	<b>S2</b> <b>(Nature matters)</b>	<b>S3</b> <b>(Revitalization of the</b> <b>Central Denmark rural</b> <b>region)</b>
Large investments in infrastructures, in particular transport, motorways and easy acces to the harbours in Tyborøn and Hvide sande and Aarhus harbour		Investments in transport systems, roads and logistics in rural areas
Large investment in East Jutland metropol region re infrastructure, logistics, transport, to facilitate easy transport of goods and work force from rural areas.		

### 5.1.9. Energy Policies

<b>S1</b> <b>(High tech Central</b> <b>Denmark Region)</b>	<b>S2</b> <b>(Nature matters)</b>	<b>S3</b> <b>(Revitalization of the</b> <b>Central Denmark rural</b> <b>region)</b>
Investment in high tech large energy plants, wind mill parks at sea etc.	Combine energy use and landscape and groundwater protection	Support network of energy producers at small/micro scale



## 6. Bibliography

Giaoutzi, M., A. Stratigea, P. Nijkamp and E van Leeuwen (2007a), *Policy Targets in the Context of AG2020, Working Paper*. AG2020 Project (Working Paper No 4).

Giaoutzi, M., A. Stratigea, P. Nijkamp and E van Leeuwen (2007b), *External and Internal Factors in the Backcasting Context of AG2020, Working Paper*. AG2020 Project (Working Paper No 5).

Stimson, R., R. Stough and B. Roberts (2006), *Regional Economic Development: Analysis and Planning Strategy*, Second Edition, Springer Verlag, Berlin.

Unnevehr, Laurian J., 2003. "Overview," 2020 vision briefs 10 No. 1, International Food Policy Research Institute (IFPRI)

Summary of the Regional Development Plan 2008 for the Central Denmark Region.  
[http://www.regionmidtjylland.dk/files/Regional%20udvikling/Regional%20Udvikling%20splan/RUP%20endelig/4100-08-160%20c%20pixie\\_engl\\_4%20korr.pdf](http://www.regionmidtjylland.dk/files/Regional%20udvikling/Regional%20Udvikling%20splan/RUP%20endelig/4100-08-160%20c%20pixie_engl_4%20korr.pdf)

### Web sources

<http://ec.europa.eu/eurostat>

<https://www.mm.dk/pdf.php?id=37544>